Microsoft® Office Access™ 2007 All-in-One Desk Reference For Dummies®

by Alan Simpson, Margaret Levine Young, Alison Barrows, April Wells, Jim McCarter

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About the Authors

Alan Simpson is the author of over 115 computer books on all sorts of topics: Windows, databases, Web-site design and development, programming, and network administration. His books are published throughout the world, in over a dozen languages, and have sold millions of copies. Though definitely in the techno-geek category, we let him contribute anyway because sometimes people like that come in handy.

Margaret Levine Young has co-authored several dozen computer books about the Internet, UNIX, WordPerfect, Access, and (stab from the past) PC-File and Javelin, including *The Internet For Dummies* (Wiley) and *Windows XP Home Edition: The Complete Reference* (Osborne/McGraw-Hill). She met her future husband Jordan in the R.E.S.I.S.T.O.R.S., a high-school computer club before there were high-school computer clubs. Her other passions are her children, music, Unitarian Universalism (`www.uua.org`), reading, and anything to do with cooking or eating.

Alison Barrows has authored or co-authored books on Windows, the Internet, Microsoft Access, WordPerfect, Lotus 1-2-3, and other topics. In addition to writing books, Alison writes and edits technical documentation and training material. In real life she hangs out with her “guys” — Parker, 6, and Mason, 4, and Evan 2 — and tries to carve out some time to practice yoga. Alison lives with her family in central Massachusetts.

April Wells is a graduate of the University of Pittsburgh and holds an MBA from West Texas A&M. She is a database administrator with expertise in a wide variety of enterprise database software programs, including Oracle, DB2, MySQL, and Access. She is the author of several books and white papers on database software and is a frequent public speaker, trainer, and consultant.

Dedication

To Susan, Ashley, and Alec, as always. (AS)

To Matt, Parker, Mason, and Evan. (AB)

To the three people who are always there for me, always support me, and never let me down — my family, Larry, Adam, and Amandya. (AW)

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We're proud of this book; please send us your comments through our online registration form located at www.dummies.com/register/.

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Contents at a Glance

Table of Contents

Introduction

Whoa! What happened to menu bars, toolbars, and all that other stuff I used to have? Well, in case you haven't noticed yet, they're all gone. Of course, if you never used Access before in your life, then you're starting fresh, so never mind. Whether you never used any version of Microsoft Access, and aren't even sure what a "version" is, you've come to the right book.

The basic idea behind Microsoft Access is to allow individuals and small businesses to manage large amounts of information the way the big corporations do — with relational databases. The difference is that while the big boys spend millions on computer hardware, software, and staffs of nerdy database-administrator types, Access allows you to do it all yourself with a run-of-the-mill PC and a realistic software budget.

Microsoft Access 2007 is the latest-and-greatest version of a long line of Access versions, starting (not surprisingly) with Version 1. Not that this is the 2,007th version. Somewhere along the way Microsoft switched from using sequential numbers for versions to using years — an idea first pioneered by the automotive industry, which sells things like "2007 Ford Mustangs" as opposed to "Mustang Version 9.3's."

Without going into boring detail about what's new in Access 2007, you find the usual kind of stuff you find in new versions these days — more power, more flexibility, more things you can do with it. And of course — along the lines of the Holy Grail of Everything Computerish these days — more taking advantage of everything the Internet has to offer. But the most noticeable change for the Access-experienced is a whole new look and feel — along with some new ways of doing things.

About Access 2007 All-in-One Desk Reference For Dummies

If you ever have the misfortune of trying to read anything written by one of the aforementioned database-administrator types, you know all about being faced with a decision among the lesser of *three* evils:

(Option 1) Try to figure it out by guessing-and-poking until you break something.

(Option 2) Part with your hard-earned money to hire someone to do the work for you, only to have someone with poor taste in clothing look at you like you're an idiot every time you open your mouth.

(Option 3) Forget computers altogether and stick with index cards.

Option 1 is the one most people try first — until they get to the part where they start breaking things and it starts costing money to get them fixed. Option 2 is too odious to warrant serious consideration. Option 3 just isn't very realistic nowadays unless you're dealing with a tiny amount of personal information. Which leaves a new Option 4 — this book.

The nerds who wrote this book are aware of the fact that *nobody* on the planet was *ever* born knowing what *any* technical term means. In fact, if at all possible, we avoid technical terms like a root canal. But because you are probably faced with technical terms outside this book, we do explain what they mean along the way.

As a rule, big fat computer books aren't such a great option. For that reason, this isn't really a big fat computer book. It's several *smaller* computer books combined into one. Each small book represents a single topic that you can pursue — or ignore — as your personal tastes and immediate needs dictate.

The idea here is definitely *not* to try to read the book cover to cover, unless you're desperately seeking a cure for insomnia. Rather, use the Table of Contents up front, or the Index out back, to look up information when trying to figure it out by guessing just isn't cutting it.

To prevent this book from topping 3,000 pages, we don't explain every possible way to do every possible thing in Access. Instead, we chose what we think are the most important database-management tasks, and we show you the best way to do each one.

Conventions

Speaking of insomnia, this book, like most books, follows certain conventions to alert you to different kinds of stuff, as follows:

Boldface: Stuff you actually *do* while sitting at your computer is shown in boldface, to distinguish it from boring information you probably don't care about anyway.

Italics: When reality rears its ugly head and we're forced to use a technical term, we always show that term in italics the first time it's used. Then we define that term, right there on the spot. Of course, that doesn't mean you won't forget the definition two minutes later. But you can easily flip back a few pages and locate the definition amidst all the other words on the page.

`Monospace`: Monospace text (text in that typeface right back there) represents *code,* instructions that are written for computers, rather than people, to follow. Computers are so stupid, the term "stupid" is a compliment. Unconscious, non-thinking, non-beings (a.k.a. *machines*) is more like it.

Anyway, when writing instructions for a computer, you *really* have to spell it out for them, right down to the blank spaces between words. Monospace text makes seeing where you have to put the blank spaces to avoid making Access say "Huh?" easier. (Actually, it can't even say "Huh?" More likely it says something really stupid like `"Syntax error in *something or other*."`)

Foolish Assumptions

Despite the fact that the word "Dummies" is clearly emblazoned on this book's cover and elsewhere, we don't presume that you're the junior partner in a ventriloquist act. (The machine you're working with, yes. You, no.) We do assume that you already know how to do some things, such as turn on your computer and click and double-click things with your mouse. Maybe type with at least one finger.

We also assume you know what those *key+key* symbols, such as "Ctrl+Esc," mean. But just in case you don't, they always mean "Hold down the first key, tap the second key, and then release the first key." Also, we always use the term "press" when referring to something you do with the keyboard. For example, the instruction "Press Ctrl+Esc" means "Hold down the Ctrl key on your keyboard, tap the Esc key, and then release the Ctrl key." *Click*, on the other hand, is something you do with the mouse pointer on your computer screen and the buttons on your mouse.

We also assume (perhaps foolishly) that you know how to work menus. Not that there are many menus in Access. But when there is a menu-like sequence we use the word "Choose" followed by the commands to choose separated by an ⇨ symbol. For example, when we say "Choose Start⇨All Programs⇨Microsoft Office⇨Microsoft Access Office 2007" that's short for "Click the Start button, click All Programs on the Start menu that appears, click Microsoft Office on the All Programs menu that appears, and then click Microsoft Office 2007 on the last menu that appears."

Click, of course, means "rest the mouse pointer on the item, and then tap the left mouse button." When we tell you to *drag* something, we mean for you to move your mouse pointer to the item, click, and then hold down the left mouse button while moving the mouse. To *drop* the item, just release the mouse button after dragging it.

We also show things like Web site URLs (addresses) — those `www.*whatever*.com` things you see all over the place. We may even throw in an occasional e-mail address (the `*somebody*@*somewhere*.com` things) without explaining how to use them. Hopefully these assumptions on our part aren't too foolish. But if we had to explain *all* that stuff here, there wouldn't be much space left for talking about Microsoft Access 2007.

What You Don't Have to Read

Because reading the instructions is something we all do only as a last resort — after guessing and trying to get help on the phone have failed — we try to point out things you really don't have to read. For example, *sidebars* (which have a gray background) are little chunks of text with their own titles. If the title looks boring, skip the whole thing.

We also put little *icons* (pictures) in the left margin to point out text that you can maybe skip over. Or in some cases, really shouldn't skip over. The icons are pretty self-explanatory. So if you want to skip the next section, that's fine by us.

Icons

As far as those presumably self-explanatory icons go, here are the explanations you can probably skip over or, at best, glance at:

WARNING!

This is stuff you probably don't want to ignore. Because if you do, you may regret it. Not that you're gonna blow up your computer or the Internet or anything if you do. But the consequences may be inconvenient or unpleasant enough to justify spending a few seconds to read what these little notes say.

TIP

May be worth reading if you're looking for a shortcut, or a better way to do things. Not as important as a warning. But probably worth a few seconds of your time.

REMEMBER

Either stuff we already told you and you probably forgot, or something that's at least worth trying to keep in the back of your mind. Even if it's way back there. Kinda like where you park your car when you go to the mall.

CROSS-REFERENCE

This *is* a reference book, and we certainly don't expect anyone to read it cover to cover. But sometimes, you just have to know "Subject *x*" before "Subject *y*" even comes close to making any sense. So when we're forced to talk about a "Subject *y*" kind of thing, we use this icon to point out where "Subject *x*" is covered.

TECHNICAL STUFF

Stuff that definitely falls into the "insomnia cure" category.

Organization

If you already looked at the Contents at a Glance up near the front of this book, or the Table of Contents right after it, you already know how stuff is organized here. In that case, you may now skip to the "Where to Go from Here" section. But because showing the contents a third time is customary (albeit kinda dumb), without the benefit of page numbers, we follow suit here. This book is actually eight little books, organized as follows:

Book I: Essential Concepts: If this is your first time using Microsoft Access, and you really don't know where else to go, starting here is a good idea. This is the stuff you really need to know to get anything done with Access.

Book II: Tables: Everything in Access centers around *data* (information) stored in tables (not the coffee kind, the columns-and-rows kind). You can't do much of anything with Access until you have some information stored in tables. This book is a good second stop for you *newbies* (beginners).

Book III: Queries: Data stored in tables tends to be pretty random and, eventually, pretty plentiful. This book shows you how to pick and choose the information you want to see, and how to organize it in a way that's more useful, such as alphabetically.

Book IV: Forms: You can definitely get away without making forms in your Access database. But if you get tired of looking at information stored in rows and columns, and are up for being creative, forms are definitely worth getting into.

Book V: Reports: Whereas forms are a way to get creative with stuff on your screen, reports are a way to get creative with stuff you print on your computer's printer. Here's where you can do things, for example, printing form letters, mailing labels, numbers with totals and subtotals, and stuff like that.

Book VI: Macros: Automating Stuff in Access: There's a technical term for you — *macros*. Nothing to be intimidated by, though. They're just a way of writing simple instructions that tell Access how to do something you're sick of doing yourself. Optional, but more fun than the name implies.

Book VII: Database Administration: Sounds like a real yawn, we know. Sometimes you just gotta do things such as make backup copies of your information, or get other people to help you with boring stuff such as typing information into your tables. This is the place where we cover those kinds of things.

Book VIII: Programming in VBA: For the aspiring mega-nerd, we didn't let this topic slide. This is where the über-technogeeks make their money. Though you can skip it if you have no such aspirations.

After that comes an appendix on how to install Microsoft Access 2007, in case you haven't gotten that far. If Access is already on your computer, there's nothing noteworthy here. If you do need to install Access, and don't feel like looking there, here's the condensed version of the appendix: Insert your Microsoft Office or Microsoft Access CD into your computer's CD drive, wait a few seconds, and then follow the instructions that appear on-screen.

Where to Go from Here

If you patiently read the preceding "Organization" section, you probably know where you need to go next. If not, you beginners should head straight to Book I, Chapter 1 to get your bearings. For the rest of you who already know some of the basics of Access, just pick whatever book or chapter talks about what you're struggling with right now.

And by the way, thanks for buying (begging, borrowing, or stealing — just kidding with that last one) this book. We hope it serves you well. For those of you who bought, an extra thanks for helping us pay down our credit cards a little.

Book I

Essential Concepts

The 5th Wave

By Rich Tennant

"We should cast a circle, invoke the elements, and direct the energy. If that doesn't work, we'll read the manual."

Contents at a Glance

Chapter 1: Introducing Access 2007

In This Chapter

- **Getting a handle on Microsoft Access**
- **Listing the six types of Access objects**
- **Laying out some essential database concepts**

Access is the Microsoft database-management program, part of the Microsoft Office suite, that enables you to maintain *databases* — collections of data arranged according to a fixed structure. Its structure makes the information easy to select, sort, display, and print in a variety of formats. With Access, you can create and maintain as many databases as you need — you can even share them with other people over a local area network or the Internet.

Access is a general-purpose program that works with almost any kind of information. A database can be as simple as a list of addresses to replace your card file. Or you can create a wine-cellar database with information about each bottle in your cellar, or a bookstore-inventory database with information about books, publishers, customers, and special orders. Access can also handle complex databases that contain lots of types of information and lots of customized programming.

An Access database can contain lists of records about almost anything, from sales to sports scores. Unlike a spreadsheet program, Access makes information in lots of different formats easy to display — including alphabetical listings, formatted reports, mailing labels, and fill-in-the-blank forms.

Access 2007 comes as a part of the Microsoft Office 2007 Professional suite of programs, and is also available as a separate, stand-alone product. Previous versions of Access have also been part of previous Office editions — Access 2003 in Office 2003, Access 2002 in Office XP, Access 2000 in Office 2000, and so forth. Because Access is part of Microsoft Office, sharing information with Word documents and Excel spreadsheets is easy.

The Six Types of Access Objects

Access databases are made up of *objects* — things you can create, edit, and delete, each with its own name and settings. *Object-oriented* systems allow you to create these things one piece at a time, using pieces that fit together.

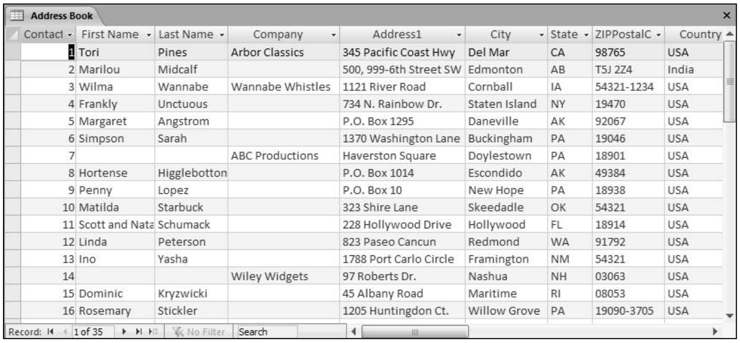
Access contains various kinds of objects, including objects for storing, displaying, and printing your data, as well as objects that contain programs you write. At first, you'll probably use only a few types of objects, but as you customize your database, you may end up using them all. You start with *tables* for storing data, *forms* for editing data on-screen, *reports* for printing data, and *queries* for selecting and combining data. Later, you may create *macros* and *modules,* which contain programs that you write.

In this section, we cover each of the main types of Access objects: tables, queries, forms, reports, macros, and modules.

Tables for storing your data

Tables are where you put your data. A table is an Access object that is made up of a series of *records* — the electronic equivalent of the index cards that make up an address list. Each record contains information in the same format. In an address list, each record contains information about one person: name, address, and other facts. Each individual piece of information — such as first name, last name, or street address — is called a *field.*

Your database can contain many tables. A bookstore database (for example) can contain a table of books (with title, publisher, price, and other information about each book), a table of vendors from whom you buy books (with company name, address, discount terms, and other information about each vendor), and maybe a table of your regular customers (with name, address, and other information). Figure 1-1 shows a table of names and addresses. Each row is a record, and the fields are shown in columns.



Contact	First Name	Last Name	Company	Address1	City	State	ZIPPostalC	Country
1	Tori	Pines	Arbor Classics	345 Pacific Coast Hwy	Del Mar	CA	98765	USA
2	Marilou	Midcalf		500, 999-6th Street SW	Edmonton	AB	T5J 2Z4	India
3	Wilma	Wannabe	Wannabe Whistles	1121 River Road	Cornball	IA	54321-1234	USA
4	Frankly	Unctuous		734 N. Rainbow Dr.	Staten Island	NY	19470	USA
5	Margaret	Angstrom		P.O. Box 1295	Daneville	AK	92067	USA
6	Simpson	Sarah		1370 Washington Lane	Buckingham	PA	19046	USA
7			ABC Productions	Haverston Square	Doylestown	PA	18901	USA
8	Hortense	Higglebotton		P.O. Box 1014	Escondido	AK	49384	USA
9	Penny	Lopez		P.O. Box 10	New Hope	PA	18938	USA
10	Matilda	Starbuck		323 Shire Lane	Skeedadle	OK	54321	USA
11	Scott and Nata	Schumack		228 Hollywood Drive	Hollywood	FL	18914	USA
12	Linda	Peterson		823 Paseo Cancun	Redmond	WA	91792	USA
13	Ino	Yasha		1788 Port Carlo Circle	Framington	NM	54321	USA
14			Wiley Widgets	97 Roberts Dr.	Nashua	NH	03063	USA
15	Dominic	Kryzwicki		45 Albany Road	Maritime	RI	08053	USA
16	Rosemary	Stickler		1205 Huntingdon Ct.	Willow Grove	PA	19090-3705	USA

Figure 1-1: A table contains records (rows) and fields (columns).

Is a spreadsheet a database?

In two words, *not really.* Many people use spreadsheet programs, such as Microsoft Excel or Lotus 1-2-3, to store lists of records. Some spreadsheet programs have limited database capabilities, but they aren't designed to do as much as a database program. You can use a spreadsheet to store an address list — and you can enter, edit, delete, and sort the addresses (one per row on the spreadsheet) — but printing mailing labels or form letters is a major chore. Spreadsheets don't (and can't) think of your data in terms of tables, records, and fields, but rather in terms of *cells* (the basic unit of a spreadsheet) arranged in rows and columns. That's too limited a model for sophisticated information management — as you've probably suspected if you're using Access for your database work. It's the right tool for the job!

After you set up tables in your database and type in (or import) information, you can sort the records, select records that match a criterion, and then display and print the records.

Proper design of your tables — choosing how many tables to create and which fields are stored in which table — is key to creating a usable and flexible database. Chapter 3 of this book includes a step-by-step procedure for designing your database, and Book II explains how to create tables and fill them with data.

Queries for selecting your data

Queries are operations that slice and dice your data to answer specific data needs. The most commonly used type of query helps you select data from a table, perhaps to select which records you want to include in a report. You can create a query that shows you all the people in your address book who live in (say) Vermont, or all those for whom you don't have a phone number. To create this type of query, you enter *criteria* that specify what values you want to match in specific fields in the tables (for example, **VT** in the State field to find Vermonters, or nothing in the Phone Number field to find the phoneless, or both).

You can also use queries to combine information from several tables. A bookstore database may store book author names in the Books table and book ordering information in the Purchase Orders table. A query can pull information from both these tables — to show (for example) all the Terry Pratchett novels you ordered for the last month. Queries can also create calculated fields, including totals, counts, and averages.

Another type of query is the *action query*, which does something to the records you select — copy records from one table to another, make a change to all the records you select, delete records you select, that sort of thing. *Crosstab queries* help you analyze the information in your tables by summarizing how many records contain specific combinations of values.

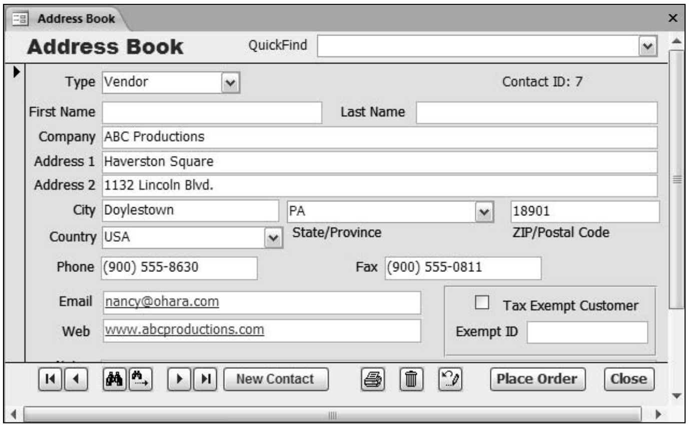
Queries are the way you get useful information out of your tables — and you'll probably create zillions of them as you play with your database. Book III explains how to create and use queries of all kinds.

Forms for editing and displaying your data

An easy way to enter data, especially into more than one related table, is to use a *form* — a standard database document that displays information from one or more tables on-screen. You can have all kinds of fun with forms; for example, you can

- edit your data or type in new records
- choose the layout of the table's information on the form
- specify the order in which your items appear
- group items together with lines and boxes
- use pull-down lists, radio buttons, and other types of on-screen controls for entering and editing data

Figure 1-2 shows a form for entering names and addresses for the Address Book table shown back in Figure 1-1.



Type Vendor
Contact ID: 7
First Name
Last Name
Company ABC Productions
Address 1 Haverston Square
Address 2 1132 Lincoln Blvd.
City Doylestown
PA State/Province
18901 ZIP/Postal Code
Country USA
Phone (900) 555-8630
Fax (900) 555-0811
Email nancy@ohara.com
Web www.abcproductions.com
☐ Tax Exempt Customer
Exempt ID

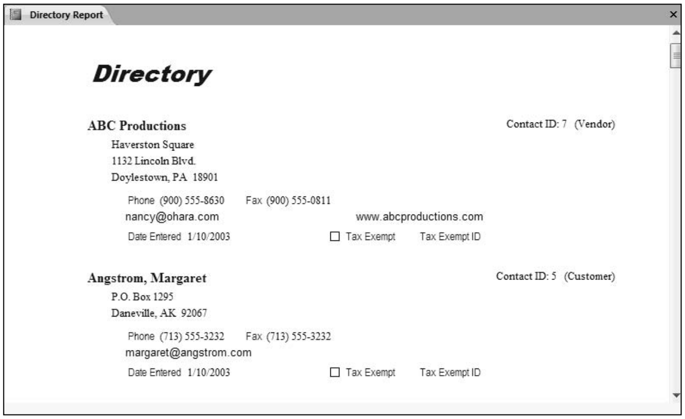
Figure 1-2: A form shows information from one table record at a time.

But why stop there? You can build intelligence into forms, too — program some smart boxes that automatically capitalize what you type in, or check your entry against a table of valid values.

After your database goes into production — that is, you use it for its intended purpose — forms become the most-used Access object. As go the forms, so goes the database — so Book IV explains how to design, create, modify, and use forms.

Reports for printing your data

Forms are primarily designed to appear on-screen; *reports* (on the other hand) are designed to be printed out, as shown in Figure 1-3. Like forms, reports display information from tables; you get to choose the layout of the information. Most reports are based on queries; you use a query to choose the information that appears in the report. The report design defines the order in which records appear, which fields appear where, and which fonts, font sizes, lines, and spacing to use. (Control freaks, rejoice!)



Directory Report

Directory

ABC Productions — Contact ID: 7 (Vendor)

Haverston Square
1132 Lincoln Blvd.
Doylestown, PA 18901

Phone (900) 555-8630 Fax (900) 555-0811
nancy@ohara.com www.abcproductions.com
Date Entered 1/10/2003 □ Tax Exempt Tax Exempt ID

Angstrom, Margaret — Contact ID: 5 (Customer)

P.O. Box 1295
Daneville, AK 92067

Phone (713) 555-3232 Fax (713) 555-3232
margaret@angstrom.com
Date Entered 1/10/2003 □ Tax Exempt Tax Exempt ID

Figure 1-3: A report lets you put Access data on paper.

In addition to reports on normal paper, you can create reports for printing on envelopes, labels, or other printed forms. Access comes with report wizards that make creating fancy reports easy. It can also print charts and cross-tabulations (*crosstabs*) based on the data in your database.

Book V covers how to create and print reports, charts, and crosstabs.

Macros for saving keystrokes

Access includes two separate programming languages: one for macros and a separate one (VBA) for larger programs. *Macros* are programs that automate the commands you give when you use Access — you “write” them by telling

Access to record your keystrokes while you do something on-screen. For example, you can write a macro that moves the cursor to the last record in the Orders table whenever you open the Order Entry form. (What are the chances that you'd want to edit your very first order? Most of us would be likelier to want to edit the *last* order or enter a new order.) Or you can write a macro that moves your cursor to the next applicable blank in a form, based on the entries you made so far.

After you get some practice at creating macros, you can create buttons on your forms that run the macros with a quick click. You can also tell your form to run a macro automatically whenever you move to a field on the form, or enter data into the field — handy!

You don't have to be a programmer to create macros. Access helps you write them by providing menus of commands. Book VI explains how to create nifty and useful macros to clean up data entry — and a number of other items — automatically.

Modules for writing your own programs

Okay, now we come to the serious programming stuff: *modules* — another term for Visual Basic programs. *VBA* (Visual Basic for Applications) is a programming language based on the age-old BASIC language; it's specifically geared for working in Access and other Office programs. Macros are fine for saving a few keystrokes or cleaning up the data you enter in a field, but when the going gets complex, you can use VBA.

Programming isn't for the technologically faint of heart. Fortunately, it's rarely necessary. But when everything else is done in your database, take a look at Book VIII for an introduction to VBA programming. Writing small programs isn't all that hard — and if you acquire a taste for programming, who knows what you'll end up creating!

Essential Database Concepts

Here are the Four Commandments of databases. (Aren't you relieved there aren't 10?). You'll find lots more important rules and guidelines throughout this book as you discover how to work with various Access objects, but these four apply right from the start, no matter what kind of database you are using:

- **Store information where it belongs, not where it appears.** Where you store information has nothing to do with where it appears. In a database, you store information in tables based on the structure of the information. (Don't worry — Chapter 3 of this book explains how to figure out the structure of your data.) Each piece of information likely appears in lots of different places. For example, in a database for an online bookstore, book titles and authors' names appear on your invoices, purchase orders, and sales receipts. But the right place to *store* those book titles and author names is in the Books table, not in the Sales table or the Purchase Orders table.

- **Garbage in, garbage out (GIGO).** If you don't bother to create a good, sensible design for your database — and if you aren't careful to enter correct, clean data — your database will end up full of garbage. A well-designed database is easier to maintain than a badly designed one, because each piece of information is stored only once, in a clearly named field in a clearly named table, with the proper validation rules in place. Yes, it sounds like a lot of work, but cleaning up a database of 10,000 incorrect records is (pardon the understatement) even more work. See Book II, Chapter 5 for ways to avoid GIGO.
- **Separate your data from your programs.** If you create a database to be shared with (or distributed to) other people, store all the tables in one database (the *back end*) and all the other objects in another database (the *front end*). Then you link these two databases together to make everything work. Separating the tables from everything else streamlines the whole rigmarole of updating queries, forms, reports, or other stuff later without disturbing the data in the tables. (See Book VII, Chapter 1 for how to separate a database into a front end and back end.)
- **Back up early and often.** Make a backup of your database every day. With luck, your office already has a system of regular (probably nightly) backups that includes your database. If not, make a backup copy of your database at regular intervals, and certainly before making any major changes. (See Book VII, Chapter 1 for how to make backups.)

Chapter 2: Getting Started, Getting Around

In This Chapter

- **Understanding the Access window**
- **Playing with Access's sample databases**
- **Using other Access window elements**
- **Getting around via the Navigation Pane**
- **Working with Access objects and wizards**
- **Saving keystrokes with keyboard shortcuts**

Before you can do much with Access, you have to get it installed and running. If Access isn't already installed on your computer, see the appendix for what to do. Then come back to this chapter for pointers on how to run it and decipher the stuff you see in the Access window.

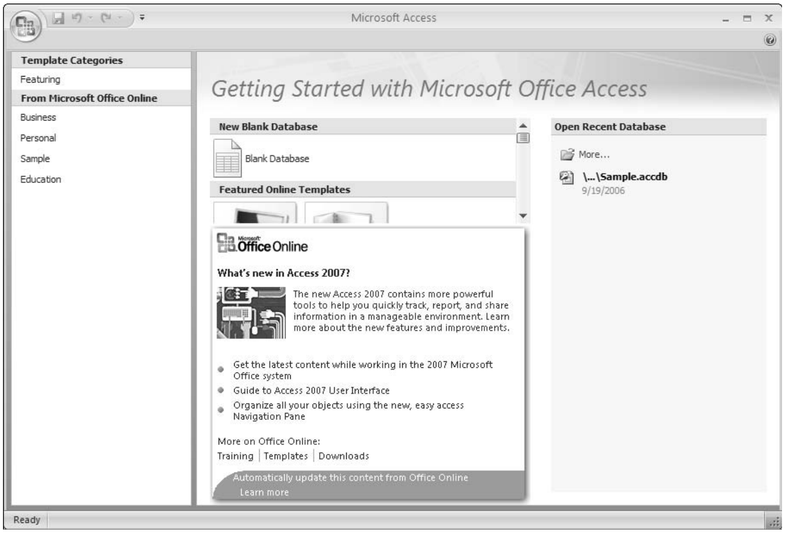
Running Access

Windows usually provides more than one way to perform a task; starting Access is no exception. The most popular way to start Access is to click Start and choose All Programs⇨Microsoft Office⇨Microsoft Office Access 2007.

Another way to get the program started is by double-clicking the name or icon of an Access database in Windows Explorer (this method both starts Access and opens the database you double-click). Or double-click the Access icon if it appears on your Windows desktop.

When you start Access without opening a database, the Access 2007 window looks like Figure 2-1.

Access 2007 wants to help you get started, and the initial window you see gives you all sorts of choices for starting to build a database. Chapter 3 of this minibook covers using Access database templates to build your own database. This chapter covers opening existing databases, or opening a brand new empty database.



Microsoft Access

Template Categories

Featuring

From Microsoft Office Online

Business

Personal

Sample

Education

Getting Started with Microsoft Office Access

New Blank Database

Blank Database

Featured Online Templates

Open Recent Database

More...

\...\Sample.accdb

9/19/2006

Office Online

What's new in Access 2007?

The new Access 2007 contains more powerful tools to help you quickly track, report, and share information in a manageable environment. Learn more about the new features and improvements.

- Get the latest content while working in the 2007 Microsoft Office system
- Guide to Access 2007 User Interface
- Organize all your objects using the new, easy access Navigation Pane

More on Office Online:

Training | Templates | Downloads

Automatically update this content from Office Online

Learn more

Ready

Figure 2-1: The Getting Started Access window.

Opening a Database

Before you can work on a database, you have to open it in Access. Okay, but wait a minute: Before you can open it, you have to create it! If you want to try Access but you don't have a database to work with, skip ahead to the "Playing with the Access Sample Databases" section (later in this chapter) to try out the Access sample databases.

You can open an existing database from the Getting Started screen, or within the regular Access window.

What's this weird security error message?

If you try to open a database containing any programming (in the form of macros, VBA procedures, or action queries, which we explain in later books), Microsoft wants you to know that you are taking a chance. Programming embedded in any document can, after all, include viruses that could infect your computer.

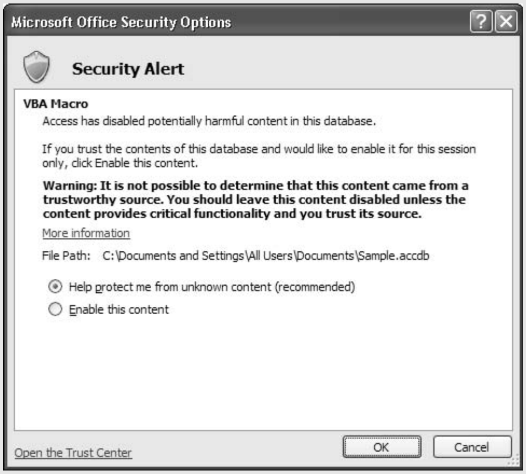
Before you panic, you need to understand some things. First, unlike in the real world, in the computer world viruses don't just happen. A *virus* is a program that must be written by a human. In nature, viruses exist because they're living beings (sort of) that can reproduce themselves. In a computer, viruses are programs, created by humans, intentionally written to do bad things and also to make copies of themselves.

So why the warning? The warning is just a general disclaimer that appears whenever you open *any* document that contains any macros, VBA procedures, or action queries. The message doesn't know whether the database contains viruses. The message is just telling you that programs of some sort — not necessarily viruses — are in the database.

In general, Access 2007 opens all databases but turns off the capability to execute code. (See Book VII, Chapter 3 for more on Access security settings.)

If the database you open when you see this message is something you downloaded from the Internet from some unknown, dubious source, then you may want to leave the database with content disabled, and look around it that way. Or to be safer, you could close the database and, instead, create a new, blank database and import the tables, queries, forms, and reports into it (but no macros or VBA code). If the database comes from someone within your organization whom you trust not to accidentally infect it with a virus, click the Options button on the Message Bar, choose Enable This Content and click OK. This option enables content until the next time you open the database, when you'll have to repeat these steps to enable content again If you created the database and it's *supposed* to contain macros, VBA procedures, or action queries, you can prevent Access from displaying the security message when you open the database. (See Book VI, Chapter 1 for details.)

If you have antivirus software, you'd do well to scan any and all files you download from the Internet for viruses before you actually open such files. These days, most viruses spread through e-mail attachments. Virtually all antivirus programs automatically scan all incoming e-mail attachments for viruses before allowing you to open them.



VBA Macro

Access has disabled potentially harmful content in this database.

If you trust the contents of this database and would like to enable it for this session only, click Enable this content.

Warning: It is not possible to determine that this content came from a trustworthy source. You should leave this content disabled unless the content provides critical functionality and you trust its source.

More information

File Path: C:\Documents and Settings\All Users\Documents\Sample.accdb

● Help protect me from unknown content (recommended)

○ Enable this content

To open a database from the Getting Started window, click its name if it appears in the list of recently used databases (on the right). If the name doesn't appear, click the More option at the top of the list of recently opened databases, and then navigate to the database.

To open a database once you see the regular Access window, follow these steps:

1. **Click the Office Button and choose Open**

   The Office Button is the round button in the top left corner of all Office 2007 applications.

2. **Choose the file name from the Open dialog box that appears.**

   You may need to browse to it. Use the icons on the left side of the Open dialog box to see different folders.

3. **Click the Open button or double-click the file name.**

   Access opens the database. If you see an alarming security message, check out the relevant nearby sidebar, "What's this weird security error message?"

Here are some handy pointers for opening databases:

- If you want to open a database that you used recently, you can open the File menu and choose the file name from the right side of the File menu.
- From the My Computer or Windows Explorer window, you can double-click the file name of an existing database to open it.
- To start Access *and* open a recently used file, choose Start➪My Recent Documents and choose the file.

When you work with a database, additional windows appear within the Access window. Exactly what you see depends on the database. A simple database displays the Navigation Pane, described later in this chapter. Some databases include macros or VBA modules that display a form and hide the Navigation Pane. The database can also be programmed to hide the standard Access components entirely.

Opening oldies

Access 2007 introduces a new file format for Access. Instead of creating `.mdb` files, Access 2007 creates `.accdb` files. The new file format enables integration with Microsoft Windows SharePoint Services 3.0 and Microsoft Office Outlook 2007, allows creation of multivalued lookup fields, and offers other new features.

Access 2007 creates `.accdb` files by default, but if you know someone with an earlier version of Access who needs to use your database, you can save it in Access 2002-2003 format, or in Access 2000 format. Click the Office button and choose Save As to see those options. You should not use the new-to-2007 features if you know you need to save the database in a different format.

Access 2007 can open databases created in previous versions of Access. Here's the scoop on what happens when you open such old Access files:

- **Access 2003:** It just opens. If you create new fields or objects that use new features in Access 2007, those objects will not work in Access 2003. Otherwise, you can return to Access 2003 if necessary with no issues.
- **Access 2002 (Office XP):**. Access 2003 uses the same file format as 2002. (If you have Access 2000, however, note that it can't open Access 2002 or 2003 files.)
- **Access 2000:** It just opens, even though the file format is slightly different. The Access title bar says `Access 2000 file format` but everything should work fine. If you create any new objects in that old file while it's open in Access 2007, they won't work if you open the database file later in Access 2000, but everything else should work.
- **Access 2.0, Access 95, or Access 97:** When you first open one of these older-format database files, Access gives you two choices:
    - You can *enable* the database, which means Access 2007 keeps that file in its usual elderly format so you can reopen it later in the older version of Access.
    - You can *convert* the old database to Access 2007 format. It's your choice; make the call based on whether you (or other people) will have to open this database in older Access versions. (See Book VII, Chapter 1 for more information about converting a database from one Access version to another.)

When you open an enabled database in Access 2007, work only with the data: You can't create or modify database objects, such as forms and reports. Some older VBA modules won't run in Access 2007, either.

I have that open already!

Access is a *multiuser database*, which means that more than one person can open an Access database at the same time. The usual way that this works is that several computers on a network (usually a local area network in an office) run Access — and all can open the same database at the same time. Access keeps track of who is doing what, and prevents the users from (virtually) crashing into each other. Two people trying to edit the same thing at the same time can be tricky — Access locks out the second person until the first person is done with the edit.

For more information, see Book VII, Chapter 2.

Getting around

After you have a database open, you're ready to have a look around. On the left you'll see the Navigation Pane that lists objects in the database (if all you see is a blue vertical stripe, click that to see the Navigation Pane; if you don't see a Navigation Pane or a stripe, talk to the database developer to find out how the database is intended to be used).

You can open Access objects by double-clicking them (unless you've changed the Navigation Options dialog box to let you single-click to open) or by dragging them into the work area.

You'll see a tab in the working area for each open object, which makes navigating between open objects easy. To close an open object, click the X on the same line as the object tab when the object is active, or right-click the tab and choose Close.

Playing with the Access Sample Databases

Access can download some databases to give you something to play with while you find out how the program works. They can even help spark ideas for your own databases.

Taking Northwind for a spin

The Northwind sample database is an order-entry system that an imaginary mail-order gourmet food company uses for tracking orders, customers, suppliers, and products. The easiest way to open the Northwind database is to choose it from the Opening window (you may have to close Access, then open it again). Click Sample from the Template Category Pane on the far left, then select Northwind from the center pane. The database needs a name in the right-hand pane — you can leave the default file name or change it. Then click Download to create the Northwind database on your computer.

You see an introductory screen (actually a form) that instructs you to click the Options button on the Message Bar and Enable content. Then you see a log-in form — choose a log-in name from the list (it doesn't matter which), and click Login.

Okay, the database opens — you can tell because a window has appeared with the name of the database as its title. So what can you do with it? How can you see what's in it? The next section describes this window, and how to get it to display all the stuff in the database.

The Access Navigation Bar, Ribbon, and File menu

If you are an old Access user, you will have immediately noticed that the Access 2007 window looks completely different than any previous version of Access. In fact, you may have flipped straight to this section to figure out how to get around the new Access interface. (Good move.)

The Ribbon

First you'll notice that there is no menu. Instead there are tabs at the top of the window, and a bunch of buttons. This is the new Ribbon that has replaced the menu and toolbars.

A number of different tabs on the Ribbon are available, and are accessed through the tabs at the top of the window. The Home, Create, External Data, and Database Tools tabs are always available. Additional tabs are available when particular objects are open — for instance, a Datasheet tab is available when a Datasheet is active. These are known as *contextual tabs*.

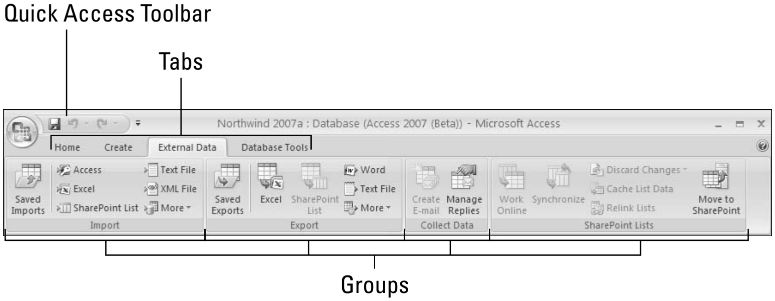


Figure 2-2: Tabs display different ribbons, and below them the Quick Access toolbar is displayed.

The Ribbon presents buttons in labeled groups. That's why this whole book tells you (for example) to click the Excel button in the Export group of the External Data tab on the Ribbon. To find that button, first click the External Data tab to display the External Data tab on the Ribbon. Then find the Export group in the middle of the Ribbon (the group names are at the bottom of the Ribbon). Then find the Excel button within that group.

Here's a description of the types of buttons you'll find on each of the tabs on the Ribbon:

- **Home:** The first button on this tab is the View button, which allows you to change the view of the object displayed (for instance, from Design to Datasheet for a table). Also contains buttons used mainly for dealing with records: formatting, creating new records, creating totals, and spelling, as well as sorting, filtering, and finding data.
- **Create:** Buttons for creating a new object in the database.
- **External Data:** Buttons to import data or objects into the current database or export data or objects out of the current database, connect and synchronize with SharePoint, and collect data via e-mail using Outlook.
- **Database Tools:** Buttons mostly of interest to developers. Buttons to display the Visual Basic editor, display (and create) relationships between tables in the database, document and analyze the database, coordinate with SQL, manage linked tables, create or manage a database switchboard, encrypt the database, manage database Add-Ins, and make an ACCDE.
- **Contextual tabs display buttons for dealing with the current object.** For instance, all the Design views have their own tabs on the Ribbon with buttons for tasks done in those views.

Every button has a descriptive *tooltip* — if you put the mouse pointer on the button you will see the tip with the name of the button, a keyboard shortcut that can be used instead of the button (for instance, pressing Ctrl+F instead of clicking the Find button), and a sentence about what the button does.

Minimizing the Ribbon

You can easily minimize the Ribbon to gain more screen real estate. To minimize, double-click the name of the active tab, press Ctrl+F1, or right click a tab and choose Minimize the Ribbon.

Click any tab or press Ctrl+F1 again to redisplay the Ribbon. However, the Ribbon will roll up again after you have clicked a button. You can use keyboard shortcuts (covered near the end of this chapter) while the Ribbon is minimized.

To redisplay the Ribbon, press Ctrl+F1 or right-click a tab and click Minimize the Ribbon to remove the checkmark.

If you like the Ribbon minimized, you may want to customize the Quick Access Toolbar to display the Minimize the Ribbon button.

Changing object views

For objects that have multiple views, you can now find View buttons in a number of places. There is a View button in the first position on the Home tab, and in the first position on the object's contextual tab. To change between the current view and the most recently displayed view, click the top half of the View button. (When you first display an object, this button switches between the Design view and the default Object view — for instance, between Datasheet view and Table Design view, Report Layout view and Design view, and so on.)

If you want to display a different view of the object, click the bottom half of the View button to display a drop-down list of all the view options, and select from that list.

Another option is the view buttons at the bottom-right corner of the Access window — this small toolbar displays one button for each available view of the open object. (Tooltips are available if you don't recognize the buttons). Yet another option is to right-click the object tab and choose the view you want.

Quick Access toolbar

Toolbars aren't completely gone! Access 2007 still contains a small toolbar (shown in Figure 2-2) that appears immediately above the Ribbon.

On the toolbar are three of the most commonly used buttons that can be used in most contexts in Access:

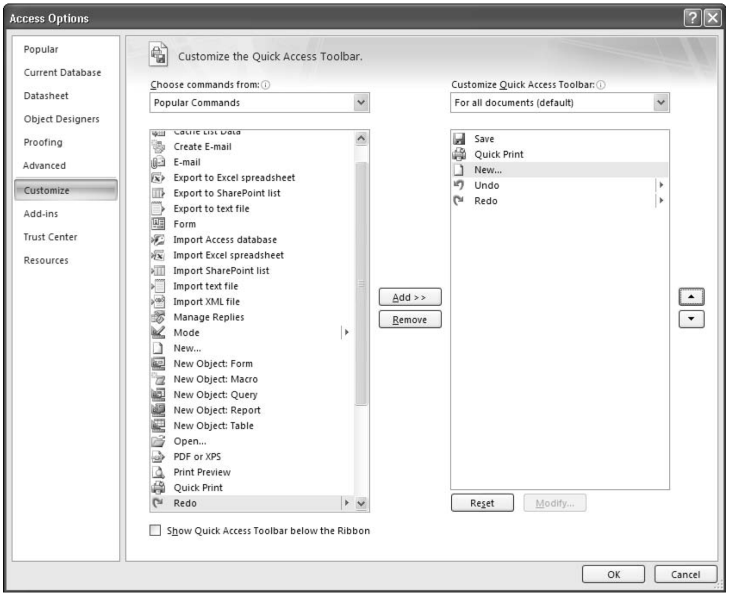
- **Save:** Saves changes to the current object.
- **Undo:** Undoes the last undoable action.
- **Redo**: Redoes the last redoable action.

The Quick Access toolbar can be easily customized. Click the fourth button, the down arrow, or right-click the toolbar to see the customization menu. A list of buttons that you can add to the Quick Access toolbar displays. Click any command (that is, Open, Quick Print, and so on) to add its button to the toolbar. If you don't see the command you want to add, see if you can find the button on the Ribbon, right-click it, and choose Add to Quick Access toolbar.

If you can't find the button you want on the Quick Access toolbar anywhere on the Ribbon, then add buttons to the Quick Access toolbar by following these steps:

1. **Choose More Commands from the Customize Quick Access toolbar menu.**

   Access displays the Customize Quick Access toolbar window of the Access Options dialog box (you can also display the Access Options dialog box using the Access Options button on the Office menu). See Figure 2-3.



Access Options

Customize the Quick Access Toolbar.

Choose commands from: Popular Commands

Customize Quick Access Toolbar: For all documents (default)

Figure 2-3: Customize the Quick Access toolbar using the Customize panel of the Access Options dialog box.

2. **On the left side at the top, choose the type of command you want to view from the Choose Commands From drop-down list.**

   Included in the list are Popular Commands, Commands not in the Ribbon, All Commands, Macros, and Office Menu. Also listed is each tab of the Ribbon. Once you have selected a Choose Commands From option, the buttons from that option appear in the box below.

3. **Choose which Quick Access toolbar you are customizing — choose from the Customize Quick Access toolbar drop-down list on the right side of the window.**

   Choose from customizing the Quick Access toolbar for all documents (that is, all databases), or just for the current database.

4. **Add buttons that appear on the left to the box on the right that contains the buttons on the Quick Access toolbar.**

   You can add a command by double-clicking the command, or by selecting and clicking the Add button. Note that you can remove a command from the right-hand box by double-clicking, or by selecting and clicking Remove.

5. **If necessary, change the order of buttons on the Quick Access toolbar by selecting a command in the right-hand box and clicking the up or down arrows that appear to the right of the box.**

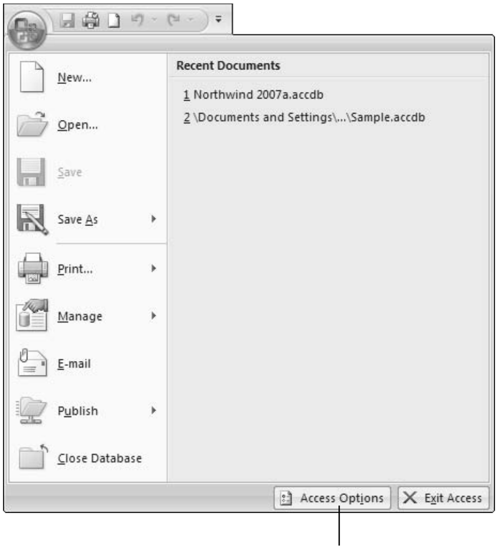
   Note that you can reset the Quick Access toolbar to its original buttons by clicking the Reset button.

6. **When you are happy with the list of commands to appear on the Quick Access toolbar, click OK to see the new, customized toolbar.**

The last thing you can do with the Quick Access toolbar is move it below the Ribbon — display the Customize Quick Access toolbar menu and choose Show Below the Ribbon.

The Office File menu

Although no menu is visible, Microsoft hasn't completely abandoned the menu concept — they've just carefully hidden it! The Office Button menu — the File menu in older versions of Access — is displayed by clicking the Office Button icon in the top-left corner of the Access window. The Office Button menu is shown in Figure 2-4.



Options button

Figure 2-4: The Office File menu, displayed by clicking the Office icon in the top-left corner of the Access window.

The menu has three important parts: the menu options (in the left column), the recent documents (in the right column), and the buttons (at the bottom). Note especially the Access Options button so you know where it is when you need it!

Mission Control: The Navigation Pane

Where is the Database Window? Gone the way of the dinosaur, and replaced by the Navigation Pane. The Navigation Pane (shown in Figure 2-5) is the table of contents for your database. From it, you can open any table, query, form, report, data-access page, macro, or VBA module in the database — all simply by double-clicking the object's name. By right-clicking objects in the Navigation Pane, you can open the object in an alternate view, change the name of an object, copy an object, delete an object, import or export an object, hide or display an object, and view the object's properties.

Toggle navigation pane display

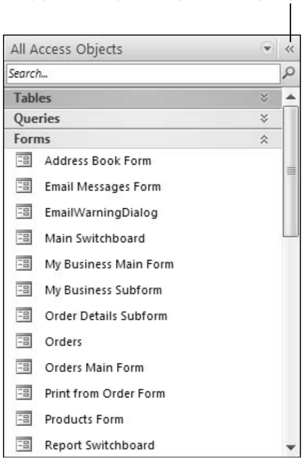


Figure 2-5: The Navigation Pane lists all the components in the database.

F11 toggles the display of the Navigation Pane — it can be rolled up into a narrow blue vertical ribbon. You can also toggle the display by using the double arrow at the top-right corner of the pane.

You can make the Navigation Pane narrower or wider by dragging its left edge.

Grouping database objects

The Navigation Pane displays the objects in the database in groups. Each group has a heading, and the group objects can be displayed and hidden by clicking the arrow at the right of the group name.

By default the Navigation Pane shows database objects in groups of related objects. To be more specific it displays all tables, and with each table is displayed all related objects.

The familiar way to group database objects is by object type, but there are other choices also. Click the drop-down arrow on the Navigation Pane title bar to see the grouping options (shown in Figure 2-6). Note that you can select one option from the Navigate To Category options at the top of the list, and one from the Filter By Group at the bottom of the list.

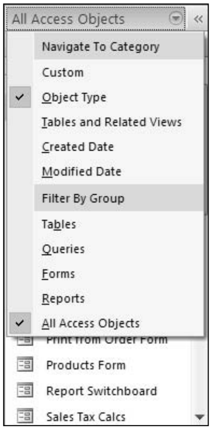


Figure 2-6: The Navigation Pane menu for grouping options.

The Navigation Pane menu is really two menus displayed as one list — the blue highlighted lines are the titles for each menu. So choose how to display database objects in this way:

1. **Select from the Navigate To Category list how you want objects grouped.**
2. **Use the Filter By Group list to filter objects if you don't want to see all of them.**

   To see all objects sorted by object type (as you used to see them in Access 2003), select Object Type from the first part of the menu, and All Access Objects from the bottom part of the menu.

Navigate To Category Options

Option	*How it groups database objects*
Custom	Displays objects grouped in the way that you define.
Object Type	Displays objects grouped by object type (Tables, Queries, Forms, Reports, Macros, Modules), with a heading for each.
Tables and Related Views	Displays objects grouped by table — that is, group names are the same as table names, and the group consists of the table and objects that are related to it in the database. Objects may appear in more than one group.
Created Date	Displays objects grouped by create date. Groups are Today, Last Week, Two Weeks Ago, Last Month, and Older.
Modified Date	Displays objects grouped by the date they were last modified. Groups are Today, Last Week, Two Weeks Ago, Last Month, and Older.

TIP

You can also choose how to group your objects by right-clicking the title bar of the Navigation Pane or empty space at the bottom of the Navigation Pane and selecting from the Category submenu.

Filtering the Navigation Pane

In a database with lots of objects, the Navigation Pane list can get very long, so Access 2007 provides the option to filter the list. To filter, display the Navigation Pane menu and choose an option below the Filter By Group heading. The last option will always display all groups.

The Filter By Group options change when you choose a different Navigate To Category option to list the relevant choices. For instance, if you choose to navigate by Object Type, the filter options are different types of objects (tables, queries, forms, and so on). However, if you choose to navigate by Tables and Related Views, then the filter options are the names of the tables in the database.

Sorting objects in the Navigation Pane

You can sort objects within a group in the Navigation Pane by using the shortcut menu. Right-click the title bar of the Navigation Pane or empty space at the bottom of the Navigation Pane, then choose from the Sort By menu. Using the Sort By menu, you can select both a sort order (ascending or descending) and an attribute to sort by (Name, Type, Created Date, Modified Date). You can also Remove Automatic Sorts (the last choice on the menu).

You can change the order of groups by using the Navigation Options dialog box, covered later in this chapter.

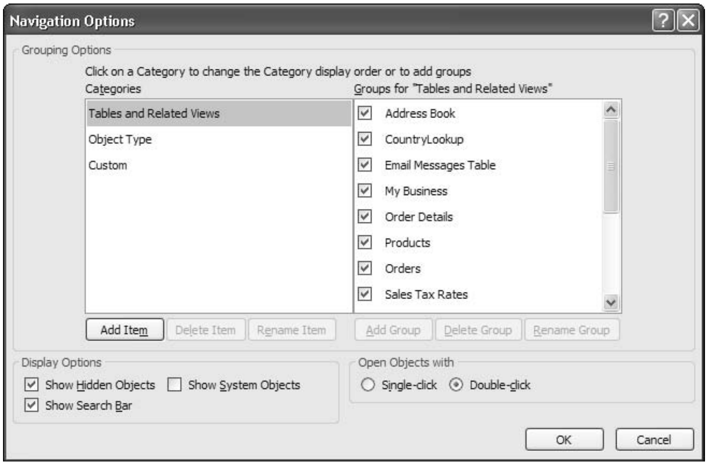
Choosing size and details for Navigation Pane objects

To determine how each object is displayed in the Navigation Pane, you can choose from three options. Right-click the title bar of the Navigation Pane or the empty space at the bottom of the Navigation Pane, then choose from the View By menu. The options are

- **Details:** Displays the name of the object, the type of object, the date it was created, and the date it was last modified.
- **Icon:** Displays a larger icon for each object, leaving more space between listed objects.
- **List:** This is the default option — which you see in the figures throughout this book. Each object displays with an icon indicating the type of object it is, and its name.

Navigation Pane options

The Navigation Pane can be a powerful tool, and there's a dialog box (shown in Figure 2-7) to control the way it works. To display the Navigation Options dialog box, right-click the title bar of the Navigation Pane or the empty space at the bottom of the Navigation Pane, then choose Navigation Options. In this dialog box, you can do several things:



Navigation Options

Grouping Options

Click on a Category to change the Category display order or to add groups

Categories	Groups for "Tables and Related Views"
Tables and Related Views	☑ Address Book
Object Type	☑ CountryLookup
Custom	☑ Email Messages Table
	☑ My Business
	☑ Order Details
	☑ Products
	☑ Orders
	☑ Sales Tax Rates

Display Options

☑ Show Hidden Objects □ Show System Objects

☑ Show Search Bar

Open Objects with

○ Single-click ● Double-click

Figure 2-7: The Navigation Options dialog box controls the way the Navigation pane works.

- **Customize group display:** You can use the Navigation Options dialog box to choose multiple groups to display (and hide others), and to create custom views.
  - Choose the category type that you want to customize from the Categories list. The list of Groups will change to reflect the groups in the selected category. Use the checkboxes to choose the groups to display — groups without a check will be hidden.
  - To change the order in which groups are displayed when displayed in Tables and Related Views, select a group name — up and down arrows are displayed. Click the appropriate arrow until the object appears in the location where you want it.
- **Find database objects:** Access 2007 has a handy tool to help you find database objects — a Navigation Pane search bar. Display the search bar by selecting the Show Search Bar option on the Navigation Options dialog box.

  Use the search bar to find objects by typing characters into the bar. As you type, the list in the Navigation Pane will update to show only those objects with those letters in their names. For instance, Figure 2-8 shows the text *orders* in the search bar, and only those objects with the word *orders* somewhere in their names are displayed in the Navigation Pane.

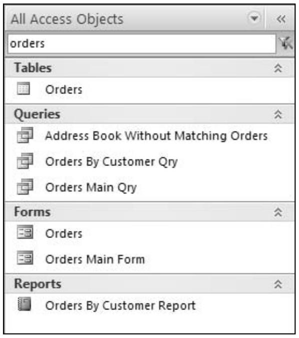


Figure 2-8: The search bar enables you to find objects with *orders* in their names.

- **Open objects with a single click:** The Navigation Options dialog box allows you to select whether to open objects with a single-click or a double-click. The default is a double-click.

Creating custom groups

Rather than using the default categories for Navigation Pane groups, you can create your own custom groups using the Navigation Options dialog box, and then drag database objects into the new groups. Here's how it's done:

1. **To display the Navigation Options dialog box, right-click the title bar of the Navigation Pane or the empty space at the bottom of the Navigation Pane, then choose Navigation Options.**
2. **In the Categories box, select Custom, or create a new custom category by using the Add Item button beneath the Categories box.**
3. **Be sure the custom category you created is selected, and create new groups by using the Add Group button below the Groups box. Change the order of the groups, if necessary, by using the up and down arrows that appear when the group is selected.**

   Be sure to leave the Unassigned Objects category checked until you have assigned objects to their groups.
4. **Click OK to close the Navigation Options dialog box.**
5. **Click the drop-down arrow on the Navigation Pane title bar, and then choose a custom category from the menu.**

   You now see the groups you created in Step 3, and the database objects in the Unassigned Objects group.
6. **Assign objects to groups by following these steps:**
   a. Select single objects, or select multiple objects by holding down Ctrl as you select.

   b. Drag objects to their new groups, or right-click, select Add to group, and choose the group name. Note that you can create a new group using this method.

   c. Notice that you are creating shortcuts to the objects (the shortcut arrow displays with the object type icon). You can rename shortcuts by right-clicking them and choosing Rename Shortcut.
7. **When all objects are assigned to groups, you may choose to hide the Unassigned Objects group.**

You can create more than one custom category, and the custom categories may be used to take the place of Switchboards that were used in earlier versions of Access.

Hiding objects

You can hide objects and groups completely, or make them unavailable (they appear on-screen but they're transparent). You can choose to hide objects individually, or you can hide whole groups. The Show Hidden Objects check box in the Navigation Options dialog box determines whether hidden objects are completely invisible or just transparent.

To hide objects, first display the Navigation Options dialog box (by right-clicking the Navigation Pane title bar) and then choose Navigation Options. To hide an entire group, right-click the group title and choose Hide. You can also hide a group by using the Navigation Options dialog box (see Customize Group Display, earlier in this chapter). To redisplay the group, check its box in the Navigation Options dialog box.

There are two ways to hide an object. You may want to hide it in a single group, or you may want to hide it so it won't appear anywhere in the Navigation Pane. Here are the possibilities:

- To hide the object in a single group, right-click the object name and choose Hide in this Group.
- To hide the object completely, right-click and choose Object Properties. Select the Hidden check box in the Attributes section at the bottom of the Property sheet.
- To redisplay the object, select the Show Hidden Objects check box in the Navigation Options dialog box to display the object in a transparent font, and then redisplay the Object Properties dialog box and deselect the Hidden attribute.

Creating, Deleting, Renaming, Copying, and Printing Objects

Throughout this book, you hear about how to create and modify tables, forms, reports, and other Access objects using the Database window. A couple of tasks that work the same way for all Access objects crop up time and again, so you may as well find out about them right here.

- **Creating an object:** Display the Create tab on the Ribbon and then click the appropriate button. You usually see options to create the object by either running a wizard to step you through the process or by using Design view — a window with settings for designing the object.
- See Book II, Chapter 1 for creating tables; Book III, Chapter 1 for queries; Book IV, Chapter 1 for forms; Book V, Chapter 1 for reports; Book VI, Chapter 1 for macros; Book VIII, Chapter 2 for VBA modules. (Ha! It *wasn't* Chapter 1 this time!)
- **Deleting an object:** Select the object and press the Delete key. Simple enough! Clicking the Delete icon on the Home tab of the Ribbon works, too, as does right-clicking the object and then choosing Delete. Access asks whether you're really, truly *sure* before blowing the object away. Just remember that when you delete a table, you delete all its data, too.

- **Renaming an object:** Click the name of the object and press F2. Or right-click the name and choose Rename. Either way, a box appears around the object's name. Type a new name and press Enter. Press Esc if you change your mind.
- **Copying an object:** Select the object you want to copy, press Ctrl+C, and press Ctrl+V. (The Copy and Paste buttons on the Ribbon work, too.) Access pops up a Paste As dialog box, asking what name to use for the copy. Type a name in and click OK.

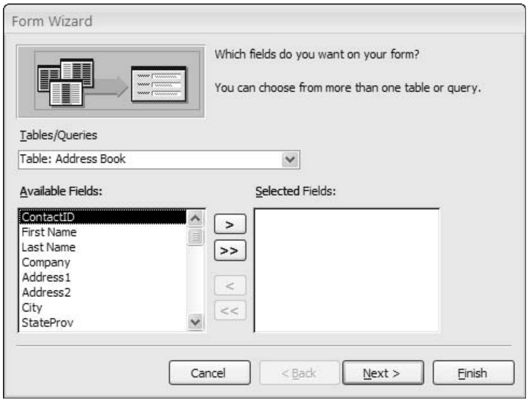
  When you are creating a form or report, starting with a copy of an existing report (rather than starting a whole new one from scratch) is faster!
- **Printing an object:** Select or open the object you want to print and then press Ctrl+P, click the Print button on the Quick Access toolbar (shown on the left in the margin), or choose Office Button➪Print. If you want to see what you get before you waste paper on it, click the Office Button, select the arrow to the right of the Print option, and choose Print Preview before printing.
- **Creating a shortcut to an object:** If you frequently want to start Access, open your database, and immediately open a specific object, you can create a Windows shortcut to the object. The shortcut can live on your Windows desktop or on your Start menu. Just drag the object from the Database window to your Windows desktop — Windows creates the shortcut. You can then drag this shortcut to the Start menu if you want the shortcut on your Start menu.

You can find lots more about printing in Book V, Chapter 2, which talks about making and printing reports.

Using Wizards

Years ago, in a land far, far away (Washington state, actually), Microsoft invented *wizards,* programs that step you through the process of executing a commonly used command. Instead of presenting you with a big, hairy-looking dialog box with zillions of options, a wizard asks you one or two questions at a time, and uses the information you already provided before asking for more input. All programs in Microsoft Office, including Access, come with wizards.

Wizards appear in dialog boxes that pop up in response to a command. For example, on the Create tab on the Ribbon, click the More button in the Forms group and choose Form Wizard. The Form Wizard pops up, as shown in Figure 2-9.



Which fields do you want on your form?

You can choose from more than one table or query.

Tables/Queries: Table: Address Book

Figure 2-9: The Form Wizard steps you through the process of creating a new form.

All Microsoft wizards follow the same pattern of asking a series of questions. Answer each question and click the Next button at the bottom of the dialog box — and you move to the next step. If you want to go back and change the answer you gave on a previous window, click the Back button. You can bag the whole thing by clicking Cancel. The Finish button is grayed out (and unclickable) until you provide enough information for the wizard to complete his (her? its?) task.

You can select all items in a list by clicking the double arrow. Select one by clicking the single arrow. And you can deselect by using the analogous arrow buttons that point in the opposite direction. It should be clear how to use other settings; if you have questions, refer to the section of the book about that particular wizard.

Getting Help

Access offers online help, and it can be quite useful, so it's worth learning how to use it. To ask the Access Help system a question, here's the drill:

1. **Click the question mark in the upper-right corner of the Access window (or press F1).**
2. **Type some search words in the Help box and then press Enter.**

   Access first searches its Help system for matches, and then displays any search results in the window.
3. **Click a topic to see more information.**

You can also click the book icon on the Help window to see the Table of Contents pane.

The following Web sites we find useful for getting answers to Access questions:

- **The Access Web:** `www.mvps.org/access`
- **Microsoft Support:** `support.microsoft.com`
- **The MSDN Library (Microsoft Developers' Network):** `msdn.microsoft.com/access`
- **TechNet Online:** `www.microsoft.com/technet`

Saving Time with Keyboard Shortcuts

Some people like to keep their hands on the keyboard as much as possible. For a fast typist, pressing keys is quicker and more efficient than pointing and clicking with the mouse. For those nimble-fingered folks, Access (like most other Windows programs) includes keyboard shortcuts — key combinations that issue the same commands you normally choose from the Ribbon.

In Access 2007, as in earlier versions of Access, you can use the keyboard shortcuts to avoid having to leave the keyboard and use the mouse to click buttons. To activate KeyTips, which help you navigate the Ribbon without the mouse, follow these steps:

1. **Press the Alt key.**

   If you look carefully, you will see letters pop up on the Ribbon — these letters correspond to tabs, sections of the Ribbon, buttons, or drop-down list items.

2. **Press the letter for the tab, section, or button you want and more letters will appear. Keep on typing until you've executed the command.**

   - The letters don't change, so you can memorize common keystrokes so that you get your work done faster.
   - Sometimes more than one character is used for a shortcut, for instance, FF for font face. Just type what you see to execute the command.

TIP

It's possible that the old menu commands whose keystrokes you memorized may still work. Give 'em a try before you give up and learn the new sequence.

Table 2-2 shows a list of our favorite shortcuts.

Some of these keystrokes only work in specific situations — for example, when you edit something or work in a particular kind of window. Throughout this book, we tell you which keys do what and when.

Table 2-2 Shortcut Keys in Access

Key Combination	*Action*
F1	Displays the Help window.
Ctrl+F1	Hides or displays the Ribbon.
F5	Goes to the record with the record number you type.
F6	Moves the focus to another area of the window.
F7	Checks the spelling in the selected object.
F11	Hides or displays the Navigation Pane.
Del	Deletes the selected object.
Alt+Enter	Displays the properties of the selected object.
Ctrl+C	Copies the selected text or objects to the Clipboard.
Ctrl+F	Finds text (with the option to replace it) in the open table, query, or form.
Ctrl+N	Starts a new database.
Ctrl+O	Opens a database.
Ctrl+P	Prints the selected object.
Ctrl+S	Saves the selected object.
Ctrl+V	Pastes the contents of the Clipboard to the active window.
Ctrl+X	Deletes the selected text or object and saves it in the Clipboard.
Ctrl+Z	Undoes the last action that can be undone (our all-time favorite!).
Ctrl+;	Types today’s date.
Ctrl+”	Duplicates the entry from the same field in the previous record.

Chapter 3: Creating a Database from Templates

In This Chapter

- **Finding and using templates**
- **Exploring a template**
- **Modifying a template to fit your needs**

Creating a database is no small feat. It takes planning, design, and plain, old-fashioned hard work. It also takes some knowledge of how database systems work: things like database design, tables, one-to-many relationships, primary keys, foreign keys, queries, forms, reports, and many other things you probably didn't learn in school.

To make matters worse, when it comes to database development, you really can't make things up and figure things out as you go. You have to design your tables correctly before you do anything else because everything you do is based on those tables. After you get going and start creating things, you often can't easily change your mind and fix the tables: In doing so, you might break many of those things you created from the original tables.

As its name implies, in Access, a *template* is a pre-designed database designed to help with a specific task. The template already has tables and some objects designed, built, and ready to go. You can use those objects as delivered in the template, or you can customize them to suit your own needs.

The advantage to a template is that you don't have to start completely from scratch. You can leverage the knowledge of someone who has already been around the block a few times to avoid common pitfalls. If you're in a hurry, a template can also save you a lot of time.

When you download a template and save it, you basically create your own database that's identical to the template. You can open and close that database as you would a database you created from scratch.

There's no rule that says you *must* change a database that you created from a template. If that database works fine for you, there's nothing more to do, other than to spend some time using and understanding that database. (The Help file that comes with the template should offer some useful information along those lines.)

If the database that the template created provides some (but not all) of the capability you need in your own database, consider the template more of a timesaver than a finished project. It's a time-saver to the extent that it will have already done much of the work for you — but you have to do the rest of the work to change the template so it suits your needs better.

Unfortunately, the template isn't much of a time-saver if you don't know what the heck you're doing! And you have to know what you're doing in order to make an effective change to a template. It's just the nature of the beast with database management.

Finding Templates

Templates aren't really a part of Access 2007. Templates are optional extras you find on the Internet. There isn't even a fixed set of templates that we can tell you about. The templates available to you vary, depending on whatever's on the Internet the day you go and check.

That's not to say that templates go away. When a template is posted, it usually stays there forever, so you don't have to worry about missing out on some great opportunity. It's just that we have no way of knowing how many templates will be available by the time you read this. We can't even predict exactly how things will look on your screen when you go looking for templates. All we can do is give you some general pointers on how to find them.

Start by opening Microsoft Office Access 2007. If you already have a database open in Access, you'll want to close that so you're just in the Access program, not in a specific database. Click the Office Button, shown in Figure 3-1, and choose Close Database if you're in a database. If you don't see anything about templates on your screen, click the Office Button and choose New.

After you click New, you see options similar to those in Figure 3-2. The left column shows Template Categories and From Microsoft Office Online. The names beneath those headings are names of categories. Click a category name. Templates within that category appear in the main pane to the right. For example, on the day we wrote this chapter, clicking Business revealed the templates shown in Figure 3-2. (There may be many others by the time you read this.)

Each icon in the center pane represents a template. For example, in Figure 3-2, Tasks, Sales Pipeline, Projects, and so forth are all templates. When you click one of those icons, the pane to the right shows information about the template. Look through the available templates and try to find one that's similar to the database you want to create. If there are several, feel free to pick any one of them and try it out. If you don't like it, you can always go back and try a different one.

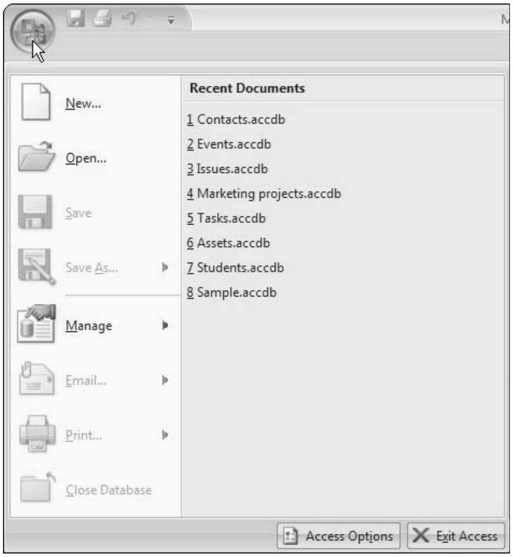


Figure 3-1: Close whatever database you're working in before you start looking for templates.

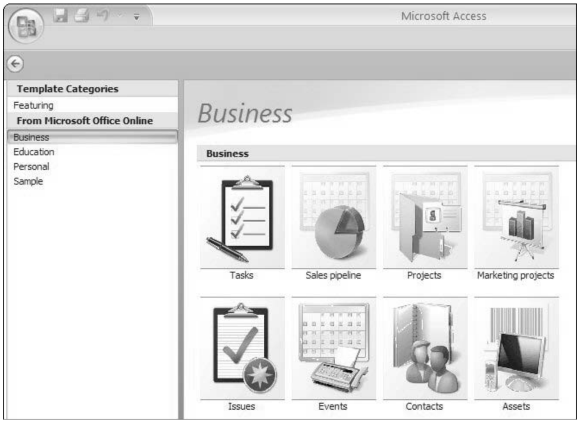


Figure 3-2: Business templates online.

After you've decided on a template, clicks its icon. You'll see a suggested filename in the right pane. You can keep that filename or give it a filename of your own choosing, but don't change the `.accdb` filename extension: That extension identifies the file as an Access database. Click the Download button. What happens next depends on the template you chose, but typically you see an "About This Template" help page that provides more information about the template. You might want to print that for future reference. Just click the Print button in the toolbar above the help page. Then you can close the Access Help window and take a look at the template.

The template is now an actual database stored on your computer. At first, it won't look like much. On the screen you'll likely see only a single table or form. But that's not the whole database. There's much more to it, as you'll discover in the next section.

Exploring a Template

As we discussed in Chapter 1 of this minibook, a database isn't a single object like a Word document or Excel worksheet. Rather, an Access database is a collection of many different kinds of objects. To see names of objects in the template you've downloaded, click the Navigation Pane at the left side of Access's program window. Then click the template name of that pane and choose Object Type, as shown in Figure 3-3.

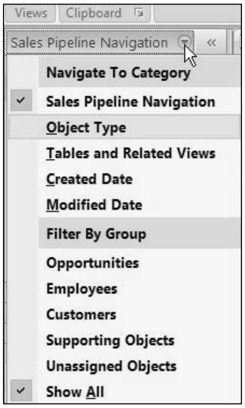


Figure 3-3: View the template's objects by type.

The left column shows bars titled Tables, Queries, Forms, Reports, and Macros. Each represents a type of Access object. Click any bar to show or hide objects of that type. The exact objects you see depend on the template you downloaded. Figure 3-4 shows a general example. You'll likely see other objects on your own screen because all templates are unique.

To open an object, double-click its name. Most objects open in the main pane to the right of the Navigation Pane. All of the tables will be empty. The idea is to enter your own data, or at least make up some sample data to play around with.

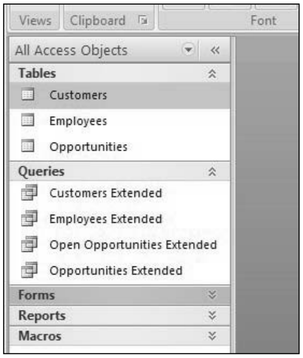
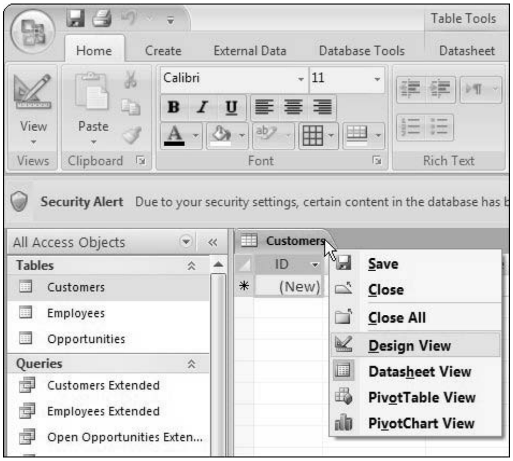


Figure 3-4: Viewing objects in a database.

Viewing an object's design

The objects in a database don't just appear out of nowhere. Someone had to create each object. They did so through the object's *Design view*. There are two ways to get to an object's design view:

- ✦ If the object is already open, right-click its tab and choose Design view, as in the example shown in Figure 3-5.
- ✦ If the item isn't already open, right-click its name in the Navigation Pane and choose Design view.



Security Alert Due to your security settings, certain content in the database has b

Figure 3-5: One way to an object's Design view.

What's up with the Security Alert?

Whenever you open a database that contains macros or VBA code, Access displays a Security Alert under the Ribbon. That's because people can use macros and VBA code to create *malware*, software that isn't good for your computer. There's no way for Access or the computer to tell if the macros and code in the database is malware or not. You have to decide that for yourself based on the source of the database.

It's safe to assume that the templates you download from the Office Online Web site do not contain malware. (At least we hope so. It stands to reason that Microsoft would be foolish to allow anyone and everyone to post templates without scrutinizing them for malware before offering them to the public.) Click the Enable Content button to allow the macros and VBA code to work.

Databases or templates that you get unexpectedly as e-mail attachments are another matter and far more risky. In fact, the only safe thing to do with such attachments is to delete them with the rest of your junk mail. Don't open them; don't save them. Stick with templates and databases from legitimate businesses and colleagues that you know and trust.

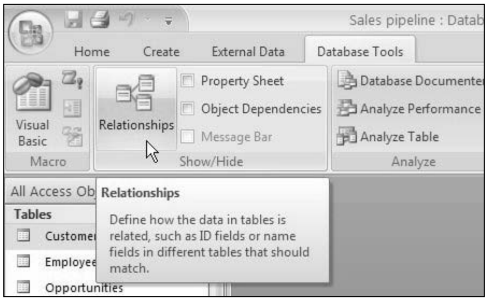
Viewing table relationships

Access is a relational database-management system, which means it's a tool for managing large volumes of data where there are natural one-to-many relationships among those data. For example, every one customer may place many orders. Every one student may enroll in many courses. Any one conference may be attended by many people. Every family unit contains many people. Every music category, such as jazz, has many artists, albums, and songs. We could fill this book with examples of natural one-to-many relationships in the world.

The natural one-to-many relationships among the kinds being managed in one database must be built into the design of its tables. Access can't figure out the one-to-many relationships for you. Designing the tables so they accurately reflect those relationships is your responsibility, unless, of course, you're using a template where someone else has already figured all that out.

The names of tables in a database don't really tell you anything about the one-to-many relationships among those tables, but you can usually see those relationships through the Relationships window. Click the Database Tools tab of the Ribbon and then click the Relationships button in the Show/Hide group (Figure 3-6). The Relationships window opens.

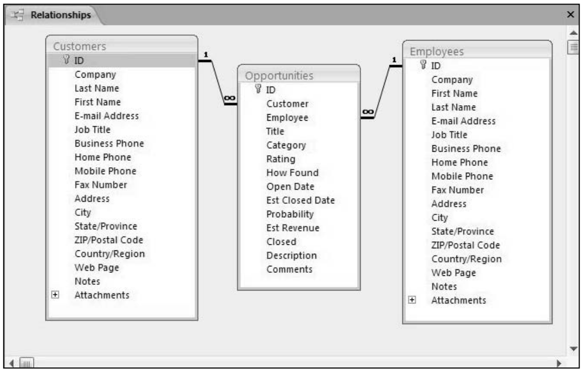
Each box in the Relationship window that opens represents a table in the current database. Each name in a box represents a field from that table. You can move and size those boxes using standard Windows click and drag. Figure 3-7 shows an example using a template that contains three tables named Customers, Opportunities, and Employees.



Relationships

Define how the data in tables is related, such as ID fields or name fields in different tables that should match.

Figure 3-6: Database tools and relationships.



Customers
- ID
- Company
- Last Name
- First Name
- E-mail Address
- Job Title
- Business Phone
- Home Phone
- Mobile Phone
- Fax Number
- Address
- City
- State/Province
- ZIP/Postal Code
- Country/Region
- Web Page
- Notes
- Attachments

Opportunities
- ID
- Customer
- Employee
- Title
- Category
- Rating
- How Found
- Open Date
- Est Closed Date
- Probability
- Est Revenue
- Closed
- Description
- Comments

Employees
- ID
- Company
- First Name
- Last Name
- E-mail Address
- Job Title
- Business Phone
- Home Phone
- Mobile Phone
- Fax Number
- Address
- City
- State/Province
- ZIP/Postal Code
- Country/Region
- Web Page
- Notes
- Attachments

Figure 3-7: Each box in the Relationships window represents a table in the database.

The lines connecting the tables describe the relationships. The little `1` points to the primary key of the table on the “one” side of the relationship. The infinity symbol (it looks like a sideways 8) points to the corresponding foreign key on the “many” side of the relationship. For every one customer record, there may be many records in the Opportunities table. Apparently employees also have lots of opportunities because for every one record in the Employees table, there many be many records in the Opportunities table as well.

You can’t change the relationships among tables in the Relationships window. Well, physically, you *could* mess around with the lines connecting the tables. But the results would probably not be good. All of the other objects in the database (queries, forms, reports) are built around the tables and relationships you see in the Relationships window. Any messing around with connecting lines would almost surely prevent those other objects from working correctly. Nonetheless, the Relationships window gives you a technical bird’s-eye view of what the database is about.

TIP

To close the Relationships window, or any other open Access object, click its Close button, which is the X button you see near the upper right corner of Figure 3-7.

Modifying Objects

Before you tear into a template and start making changes, you really need to spend some time working with it. Get to know what it is and how it works. Get a feel for what's good for your own personal needs, and what's not so good or missing. Because forms and reports act as the main user interface to a database, you'll probably want to spend most of your time with those.

There are two ways to use each object.

- **In Design view:** One way is in the Design view, where you actually create or modify the look and feel of the object. In Design view, you're playing the role of the person who is creating the database.
- **As a user of the database:** The other way to use an object is as a *user* of the database. The person who uses a database isn't necessarily the same person who designed and created the database. The user just uses the finished database to put data into the database, and get data out of the database.

Keep in mind that you never use Design view to *use* an object. To use an object, you double-click its name in the Navigation Pane; you use Design view only to *change* an object. Finally, keep in mind that the data you see in most forms comes from the underlying tables. If you want to add a field, you actually have to add the field to an appropriate table *before* you add it to the form.

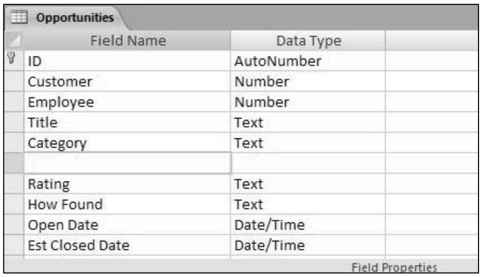
Modifying tables

All of the information that an Access database keeps track of is in its tables. If you need to store more information than a template provides, the first step is to create a field for that data. You can't just stick the field in any table though. It has to be in whichever table is appropriate for the field. For example, if you need to store more information about contacts or customers, the field has to go into the Contacts or Customers table.

To modify a table, open it in Design view. Scroll to the bottom of the list of fields names already in the table. Or, to insert a new field above an existing field, right-click the existing field's name and choose Insert Rows. Then you can type the new field's name into the Field Name column (Figure 3-8).

After you type the field name, choose an appropriate data type for the new field. After you've chosen the data type, you can use options under Field Properties to set a size, format, caption, default value, or whatever is appropriate to your field and the data type you chose.

For more information on relationships between tables, see Chapter 4 of this minibook. For general information on tables, field names, data types, and field properties, see Book II.



Opportunities

	Field Name	Data Type
🔑	ID	AutoNumber
	Customer	Number
	Employee	Number
	Title	Text
	Category	Text
	Rating	Text
	How Found	Text
	Open Date	Date/Time
	Est Closed Date	Date/Time

Field Properties

Figure 3-8: A table design with an empty row inserted.

The column to the right of the Data Type field is labeled Description (on your screen). The Description for a field is optional. Feel free to leave it blank. You can add as many fields as you wish.

Changing the primary key, its field name, or data type will likely cause a world of problems. You might be thinking of using some other unique value, like a part number, product ID, Social Security number, e-mail address, or whatever as a primary key. It's fine to add such a field to a table. But don't mark it as the primary key.

After you've added your own custom primary key field, you can set its `Indexed` field property to `Yes, No Duplicates`. That prevents duplicate records with the same value from being entered into the table. And it won't mess up the existing primary key, queries, or other things in the database that require the table's current primary key field.

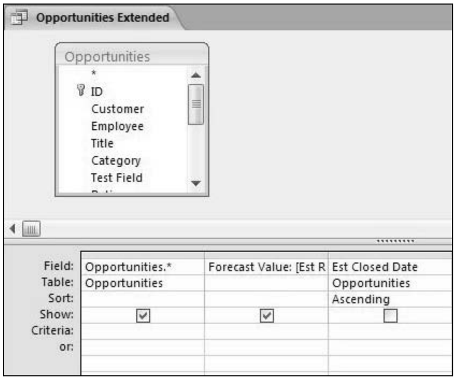
Deleting fields and changing existing field names could result in some problems as well. The more existing fields you add or change, the more problems you're likely to create later down the road for yourself.

Modifying queries

Queries provide a means of sorting and filtering data from a table. They're also the tool used to bring data from multiple tables together as though the data were stored in one big table. They're used mainly to create a dataset to which you bind a form or report.

When you add a field to a table, that field doesn't necessarily get added to all queries to which the table is bound. It only gets added, automatically, to queries that contain a `*` column. The asterisk (`*`) is the symbol for "all fields from the table." Of course, it also only gets added to queries that include the table to which you added the field. Other queries don't need the field.

To see to which table (or tables) a query is bound, right-click the query name and choose Design view. The table(s) to which the query is bound appears as a field list at the top of the query. For example, the query in Figure 3-9 is bound to the Opportunities table, because a field list for that table is right at the top of the query.



Field:	Opportunities.*	Forecast Value: [Est R	Est Closed Date
Table:	Opportunities		Opportunities
Sort:			Ascending
Show:	☑	☑	□
Criteria:			
or:			

Figure 3-9: A query in Design view.

In Figure 3-9, you can also see that the query already includes all fields from the Opportunities table. You can tell by the word `Opportunities.*` in the first column of the first row. `Opportunities.*` means "all fields from the Opportunities table." Open that same query in Datasheet view, and you'll see it already contains all fields from the Opportunities table, including fields you added yourself.

In short, if you add a field to a table, you only need to add that same field to queries that are bound to that same table: Don't use the * symbol to automatically pull all fields from a table.

If a query is bound to a table you've changed, and if that query doesn't use the * operator to bind to all fields, you can add the field to the query. Just drag the field's name from the field list at the top of the query into the query grid.

For more information on queries, see Book III.

Changing forms

Most Access forms are like fill-in-the-blank paper forms, except you fill in the blanks on-screen rather than on paper. But forms can actually contain just about anything you want, including pictures, charts, graphs, and columnar tables.

Most forms get their data from tables or queries that are bound to tables. When you enter data into a form, you're really entering it into the underlying table. When you change or delete data on a form, you're really making that change to the underlying table.

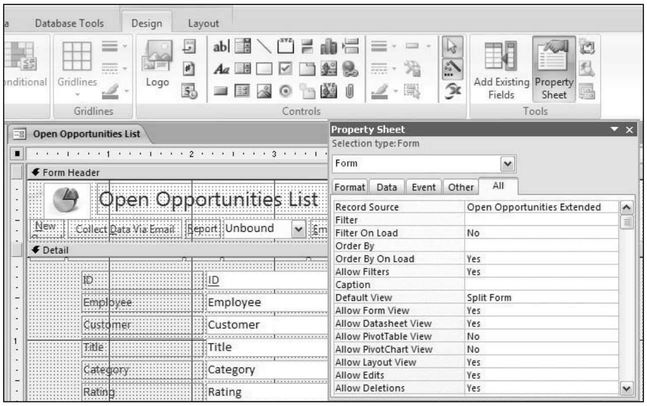
As with any object, you open a form by double-clicking its name in the Navigation window. The form opens in Form view, where you can interact with data from the underlying table.

When you want to change a form, open it Design view. As always, you can right-click the form's name and choose Design view. If the form is already open, right-click its tab and choose Design view.

Most forms are bound to an underlying table or query. The name of that table or query shows in the `Record Source` property when you're viewing properties for the form as a whole. So let's say you've opened a form in Design view and want to know which table or query it's bound to. Here's how you find out:

1. **If the Property sheet isn't already open, press Alt+Enter or click the Design tab, then click the Property Sheet button in the Tools group in the Ribbon.**
2. **Choose Form from the Selection Type drop-down list to view properties for the form as a whole.**
3. **Click the Data or All tab so you can see the `Record Source` property.**

You can move and size the sheet, and change column widths using standard Windows click-and-drag techniques. Figure 3-10 shows an example of a Property sheet. There you can see where `Form` is the selection type; the All tab is selected.



Selection type: Form

Form

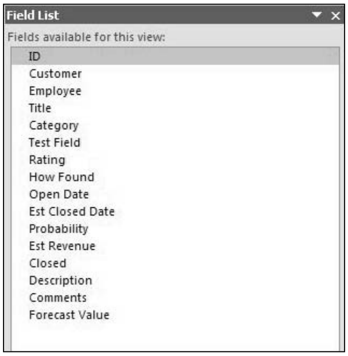
Record Source	Open Opportunities Extended
Filter	
Filter On Load	No
Order By	
Order By On Load	Yes
Allow Filters	Yes
Caption	
Default View	Split Form
Allow Form View	Yes
Allow Datasheet View	Yes
Allow PivotTable View	No
Allow PivotChart View	No
Allow Layout View	Yes
Allow Edits	Yes
Allow Deletions	Yes

Figure 3-10: Property Sheet with `Form` selected under Selection Type.

The `Record Source` property tells you that the form `View` is bound to an object named `Open Opportunities Extended`. You'd find that object listed under `Tables` or `Queries` in the Navigation Pane.

So, say the form you're currently working on is bound to a table to which you've added one or more fields of your own. How do you get your field(s) onto the existing form?

First you have to get to the Field List for the underlying table or query. To do that, click the Add Existing Fields button from the Tools group of the Design tab of the Ribbon. Each name in the Field List that opens represents a field from the underlying table or query. Figure 3-11 shows an example.



Field List

Fields available for this view:

- ID
- Customer
- Employee
- Title
- Category
- Test Field
- Rating
- How Found
- Open Date
- Est Closed Date
- Probability
- Est Revenue
- Closed
- Description
- Comments
- Forecast Value

Figure 3-11: A sample Field List.

Any fields you added to the underlying table should be included in the Field List. So it's just a matter of dragging that field name from the Field List onto the form. (Well, that plus using some basic form-design skills to make things look clean and tidy.)

See Book IV for the full scoop on designing forms.

If a field that you added to a table doesn't show up in the Field List, consider the Record Source. If the current form isn't bound to the table to which you added the field, that's your explanation. Only forms that are bound to the table to which you added the field will show the new field in the Field List.

If the Record Source is a query, there are a couple of reasons why your field might not show up in the Field List: for example, if that query isn't bound to the table to which you added the field. The table to which you added the field isn't relevant to the query or the form. But if the query is bound to your table, you need to open that query and add your custom new field to that query's grid to get that field to show up in the Field List.

All of what we just told you reflects on the fact that you really can't build Access database with zero knowledge of databases and zero knowledge of the template with which you're working. You really need to understand database design and how to construct tables to accurately reflect the natural one-to-many relationships among the data you're managing. A template won't really help with that part of it. A template just saves you the trouble of having to develop each and every object from scratch.

Modifying reports

Every report is bound (like a form) to an underlying table or query. The main difference is that reports are all about printing data on paper. Forms are about displaying and interacting with data on the screen. But you modify reports using the same tools and techniques you use with forms:

- To view a report, double-click its name in the Navigation Pane.
- To print an open report, click the Print icon up by the File button.
- To modify a report, open it in Design view.
- To see what table or query a report is bound to, choose Report as the selection type in the Property sheet. Then look at the `Record Source` property on the Data or All tab of the Property sheet.
- To add your own fields to a report, open the Field List, and then drag field names onto the report design.

See Book V for the lowdown on report design.

Exploring buttons

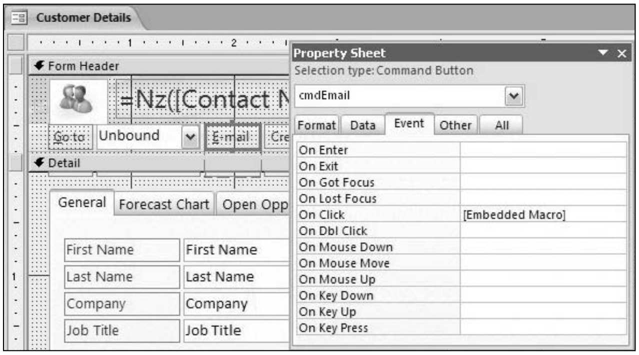
As you explore a template, you may find buttons or other clickable items that perform some action. Or you might find a drop-down list that lets you choose a person's name and go straight to that person's record on the form. These things are fundamentally different from the controls that show data from the underlying table. Usually, they're *unbound*, meaning they're not bound to a field in an underlying query or table.

Buttons, links, and other controls that take action when you click them are usually tied to a macro or VBA code. To find out how such an item works its magic, follow three quick steps:

1. **In Design view, open the form that contains the button or link.**
2. **Click the item to select it.**

   The Property sheet changes to show properties for that selected item.
3. **If the item you clicked is a button, link, or other unbound control, click the Event tab see clues as to how the item works.**

In Figure 3-12, we've clicked a button named E-mail in a form from a template. We've also opened the Property sheet and clicked the Event tab.



Property Sheet

Selection type: Command Button

cmdEmail

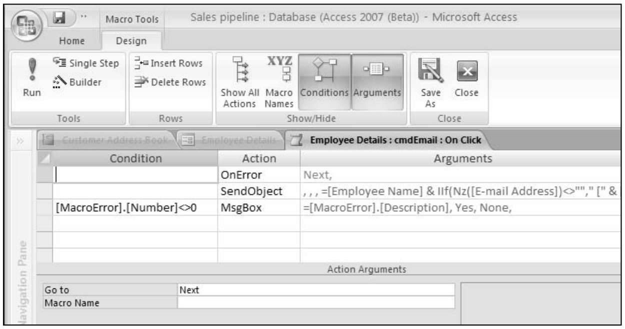
On Enter	
On Exit	
On Got Focus	
On Lost Focus	
On Click	[Embedded Macro]
On Dbl Click	
On Mouse Down	
On Mouse Move	
On Mouse Up	
On Key Down	
On Key Up	
On Key Press	

Figure 3-12: The selected button and Property Sheet Event tab.

In Figure 3-12, the Property Sheet tells us three things about the currently selected item:

- **It's a command button.** (It says Command Button at the top of the Property sheet, next to Selection Type.)
- **Its name is** `cmdEmail`**.** (The item's name appears in the drop-down list at the top of the Property sheet.)
- **Clicking the button executes an embedded macro.** (The `On Click` property shows `[Embedded Macro]`.)

To see the embedded macro, first click the words `[Embedded Macro]`. You see a button with three dots on it (. . .). That's called the Build button. When you click the Build button, the embedded macro opens in the Macro Builder, shown in Figure 3-13.



Condition	Action	Arguments
	OnError	Next,
	SendObject	, , , =[Employee Name] & IIf(Nz([E-mail Address])<>""," [" &
[MacroError].[Number]<>0	MsgBox	=[MacroError].[Description], Yes, None,

Action Arguments

Go to	Next
Macro Name	

Figure 3-13: Macro Builder.

There isn't really any way to modify a macro by guessing or trying to figure it out. You need a thorough understanding of what macros are and what they can do in order to make any useful change to a macro. To leave the Macro

Builder and return to the form, click the Close (X) button, shown above and to the right of the `Comment` column heading shown in Figure 3-13.

See Book VI for the story on macros.

Using a Template Database

So far in this chapter we've looked at techniques for using a template as the starting point for creating your own database. But modifying a database isn't a requirement. You can use a template database as-is, without making any modifications whatsoever. Exactly how you use a database varies from one database template to the next. Hopefully, the Help that came with the template will explain that. But basically you just don't use the Design view to modify objects. You simply open an object (by double-clicking its name in the left column) when you want to use it.

For example, the sample Sales Pipeline database in this chapter includes a form named Customer Details. When you double-click that form name, it opens as in Figure 3-14. To use the form, you fill in the blanks with information about an actual customer. Or, in the case of the picture, you right-click the generic picture, choose Manage Attachments, and use the Add button to add one or more pictures.

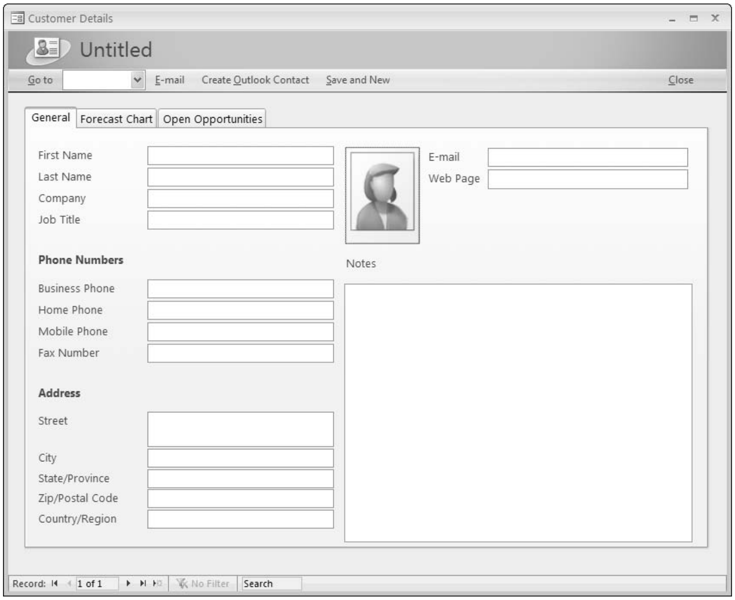


Figure 3-14: A sample form.

You can also enter data directly into tables. For example the Sales Pipeline table contains tables named Customers, Employees, and Opportunities. Double-clicking any table name in the Navigation Pane opens the table. You can type data directly into the table. (The ID field gets filled automatically, so you can leave that field alone).

Queries, reports, and forms show data from tables. Each time you open one of those kinds of objects, it automatically reflects data that's currently in the tables.

So really, the main advantage to using a template is that someone has already done the work required to create the database. But you still need to know quite a bit about Access to modify the template, or even just to use it as-is. First and foremost, you have to understand what tables are and how to put data directly into tables. That's what Book II, Chapter 2 is about.

It's unlikely that you'd ever need to work directly with queries in a template database. But you'll probably want to use the template's forms and reports. You can open any form or report just by double-clicking its name in the Navigation Pane. Most will be empty until you've put some data in the tables. Books IV and V talk about forms and reports in detail.

Chapter 4: Designing Your Database the Relational Way

In This Chapter

- **Designing the tables in which you'll store your data**
- **Streamlining your design to make it truly "relational"**
- **Linking your tables together with joins**
- **Choosing the right data types for your fields**
- **Compatibility between Access versions**

Relational database design? Yikes! Sounds like a serious programming project. But what is it, exactly? Designing a database means figuring out how the information is stored — that is, which information Access stores in each table of the database, and how it all connects together. Unlike working with a spreadsheet or word processor, you have to design a database beforehand — you can't just start typing information in. (Well, sure, you can, but we don't recommend it — the result is usually a mess.) How easy it is later to enter and edit information and create useful queries, forms, and reports depends on how well your database is designed. A good database design can streamline your work in Access.

This chapter takes you through the process of designing the table(s) you need in your database, including the relationships between them. Book II, Chapter 1 contains the instructions for creating the tables in Access.

What Are Tables, Fields, and Keys?

In Access, you store your data in *tables* — lists of records that work like the index cards that make up an address list. Each record contains information in the same format, in *fields* — specified places for individual pieces of information.

If you want to keep track of the customers of your store, you make a table of customers, with one record per customer. Each record is made up of the same set of fields, which could be the customer's last name, first name, street address, city, state or province, ZIP or postal code, country, and phone number (as shown in Figure 4-1).

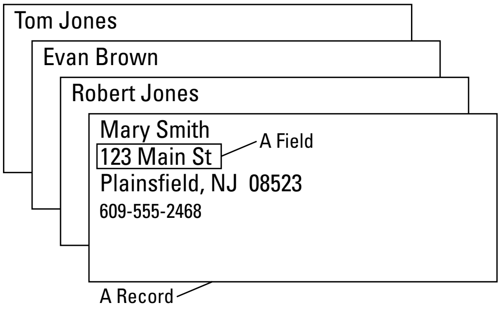


Figure 4-1: File cards showing records and fields.

After you use Access to create a table, you can *really* get busy — entering, editing, deleting, and sorting the records in various ways, and printing many types of reports (including columnar reports, forms, summaries, mailing labels, and form letters). Access allows you to create as many tables as you need in your database.

Designing a database means deciding (for openers) what tables your database will need to include, and what fields are in each table. At the most basic level, it means designing the needed forms and most likely required reports. This is the computer equivalent of designing the form or file card onto which you write the data, specifying which blanks need to be filled in and which are optional.

Data types

Fields can be different *data types*. Some fields contain textual alphanumeric information, such as a last name or street address. Other fields contain numbers, such as someone's age. Others contain logical information — a yes or no regarding some condition. Still others contain dates or times, such as the date that the record was added to the database. Table 4-1 contains a list of the most commonly used Access data types.

Table 4-1 Commonly Used Data Types for Fields

Data Type	*What It Holds*
Text	Short chunks of text up to 255 characters, or special codes that contain non-numeric characters, such as phone numbers ((xxx)xxx-xxxx) and ZIP codes (xxxxx-xxxx) that require parentheses and hyphens, which aren't allowed in numbers.
Memo	The same information as a Text field, but more of them — up to 65,536 characters.

Data Type	*What It Holds*
Number	Only numbers. You may use + or – before the number, and a decimal point. You can use Number fields in numeric calculations. Number fields come in a bunch of different sizes, depending on how large the numbers are and how many decimal places you want to store. (See Book II, Chapter 1.)
Currency	Numbers with a currency sign in front of them ($, ¥, and so on). You can do numeric calculations with these fields.
AutoNumber	Numbers unique to each record and assigned by Access as you add records, starting at 1.
Date/Time	These fields calculate (what else?) dates and times.
OLE	Object Linking and Embedding. Here's where you can embed other kinds of data in your database — pictures, sound, Word documents, even video.
Hyperlink	This text string is formatted as a hyperlink (if you click the link, it takes you to the page) — especially useful for databases that would benefit from having Web pages linked to them.
Yes/No	Yes or no (a particular condition is, or isn't, in effect) — or other two-word sets, such as True/False, On/Off, or Male/Female.

Primary key fields for your tables

A *primary key field* (or just *key*) is a field that uniquely identifies each record in a table. If (for example) each product in a Products table has a different product code, then the `Product Code` field uniquely identifies a record in this table. If you search the Products table for a product code, you come up with — at most — one record.

However, not all tables have an obvious key field. You may have to combine two or three fields to come up with values that are different for *every* record in the table. In a Books table, for instance, you may have several books with the same title. If you assume that an author never writes more than one book with the same title, a combination of the Title and Author fields may work as a key field.

For an address list, you may think that the combination of first and last name would do the trick, but it doesn't take long before you realize that you know two Jim Smiths. You could use a combination of first name, last name, and phone number, but you have another alternative: Have Access issue each record a unique number, and use that number as the key field. If you can't figure out a good set of keys to use for a table, add an AutoNumber field, and Access automatically numbers the records as you add them.

Access doesn't absolutely require every table to have a primary key field (or fields), but if you plan to set up relationships between your tables, some tables definitely need them. Also, key fields speed up a search for records; Access creates an index for each primary key field and can zero in quickly on any record by using those primary key values.

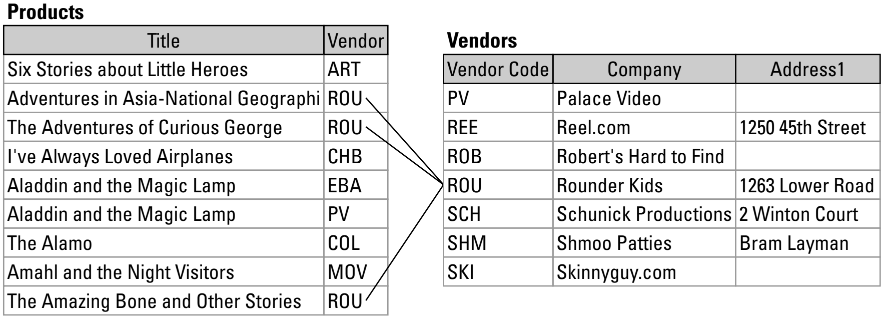
What Are Relationships?

No trick question here — it's just that some projects (*most* projects) require more than one table. For example, a database for a store has to handle lists of customers, lists of products, and lists of vendors, for a start. All those bits of data have to be coordinated in some useful way.

That's where *relational databases* fill the bill. A relational database contains tables that are related — well, no, not as cousins or sisters-in-law. Two tables are *related* if they contain fields that match. If you have an online video store, a relational database system probably includes related Products and Vendors tables like these:

- **The Products table:** This is a list of the videos and other products you sell, containing one record for each product. Each record for a product includes a field that identifies the vendor from whom you buy your stock.
- **The Vendors table:** This list includes name, address, and other information about each vendor.

The Products table and the Vendors table are related because the record for each video includes the name of a vendor; multiple videos may come from one vendor. Figure 4-2 shows how such a *one-to-many* relationship (more about that in a minute) works.



Products

Title	Vendor
Six Stories about Little Heroes	ART
Adventures in Asia-National Geographi	ROU
The Adventures of Curious George	ROU
I've Always Loved Airplanes	CHB
Aladdin and the Magic Lamp	EBA
Aladdin and the Magic Lamp	PV
The Alamo	COL
Amahl and the Night Visitors	MOV
The Amazing Bone and Other Stories	ROU

Vendors

Vendor Code	Company	Address1
PV	Palace Video	
REE	Reel.com	1250 45th Street
ROB	Robert's Hard to Find	
ROU	Rounder Kids	1263 Lower Road
SCH	Schunick Productions	2 Winton Court
SHM	Shmoo Patties	Bram Layman
SKI	Skinnyguy.com	

Figure 4-2: A one-to-many relationship links the Products and Vendors tables — three videos come from one vendor.

Well, sure, you *could* store product information and vendor information together, in one big table, but you'd soon be sorry. You may want to add fields to the Products table to contain the address of the vendor from which you bought the video. But here's the problem: Whenever a vendor's address changes, you have to make that change in the record for *every item* you buy from that vendor. What a pain!

A key principle of database design is: *Store each piece of information once.* If you store information more than once, then you have to update it more than once. (In real life — trust us on this one — if you update it in some places but not in others, you end up with a mess.)

How relationships work

Sorry, no advice for the lovelorn here — luckily, relationships between tables are much simpler than relationships between people. For two tables to be related, you specify one or more fields in one table that match the same number of fields in the other table. In Figure 4-2, the Product table relates to the Vendors table because the Vendor field in the Products table contains values that match the Vendor Code field in the Vendors table. When you look at a video in the Products field, you can find information about the product's vendor by finding the record in the Vendors table that has the same value in the matching field.

Relationships, also called (less romantically) *joins*, come in several flavors:

- **One-to-many:** One record in one table matches no, one, or many records in the other table. The relationship in Figure 4-2 works this way because one vendor can sell many videos.
- **One-to-one:** One record in one table matches exactly one record in the other table — no more and no less.
- **Many-to-many:** Zero, one, or many records in one table match zero, one, or many records in the other table.

The next three sections explain these three types of joins.

One-to-many relationships

This type of relationship is the most common among tables (by analogy, think of one person with a circle of friends). In a one-to-many relationship, many records in one table can match one record in another table. Here are some examples of one-to-many relationships:

- **Items in customer orders:** If you run a store, customers frequently buy several items at the same time. One record in the Orders table could match several records in the Products table.

- **Vendors and invoices:** If your company buys many items from another company, you end up with a bunch of invoices from (and payments to) that company. The relationship between the Vendors table and the Invoices table in an accounting database is one-to-many.
- **People living in states or provinces:** The United States and Canada use standard two-letter state and province abbreviations, and if you have an address list, these codes should be correct. (Quick — is Quebec "QU" or "PQ"? No peeking.) To make sure you type in the valid state and province codes for the United States and Canada, you can create a State/Province Codes table against which you can validate entries in the `State` field of your Addresses table. One record in the State/Province Codes table can match many records in the Addresses table.

You use a one-to-many relationship to avoid storing information from the "one" table multiple times in the "many" table. For example, you don't want to store all the information about each student in the record for every class — unless you want to hear the groan of an overloaded drive. Storing each student's information in one place (the Students table), and storing only the student's name and/or student ID in the Classes table is more efficient (and easier to maintain).

Many database designers call the "one" table the *master* table and the "many" table the *detail* table. In Access, *primary key* means the matching field(s) in the master table; *foreign key* means the corresponding field(s) in the detail table. In Figure 4-2, the Vendors table is the master table and the Products table is the detail table. The primary key (in Vendors) is the `Vendor Code` field; the foreign key (in Products) is the `Vendor` field.

One-to-one relationships

This type of relationship — where one record in one table matches exactly one record in another table — is much less common in database design. However, you may have reasons (perhaps *security* reasons) for separating information into two tables. Suppose, for example, you store information about the employees of your company. The Employees table contains the basic information about each employee (name, address, phone, and other personal information). The Employee Health table contains information about each employee's health-insurance policy (in your company, all employees have insurance). Each record in the Employees table matches exactly one record in the Employee Health table, and vice versa.

The question is: If you have exactly the same number of records in the two tables, and they match exactly, why not just combine them into one table? Most of the time, that's exactly what you should do. In the employee-database example, you can just add the health insurance information to the Employees table and do away with the Employee Health table.

However, occasionally you have a good reason to separate information into two tables connected by a one-to-one relationship. We came up with two such scenarios:

- **Security:** One of the tables contains much more sensitive information than the other, and you want to restrict who can see the information in that table. Store the sensitive information in a separate table.

  See Book VII, Chapter 3 for how to set up security for a database.

- **Subset of records:** Maybe only some of the employees in your company have health insurance. (This is the real world, after all.) Rather than leaving a lot of fields blank in the Employees table, storing insurance data in a separate, related table is more efficient.
- **Multiple databases:** Some information is stored in a separate database. When you use one database, you can *link* to a table in another database to work with the information in that table as if it were stored in your own database. If someone else's database has information you need and you link to it, you can't combine the two tables into one table, but you can set up a relationship.

Don't be surprised if you almost never create one-to-one relationships between database tables; *we* hardly ever do.

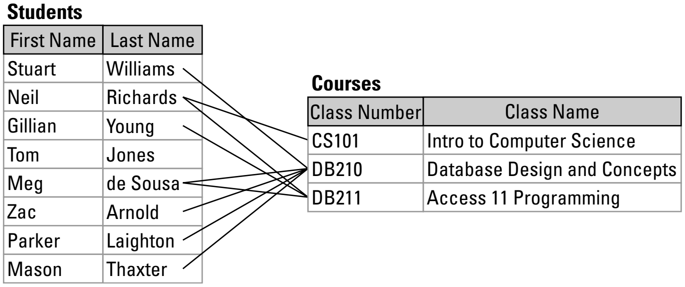
For a one-to-one relationship, you need one or more fields that link the two tables. Make sure that both tables have the same primary key field(s).

Many-to-many relationships

Many-to-many relationships are more complicated than either one-to-one or one-to-many relationships. That's because a many-to-many is really two relationships in one. Here are some examples of tables in which zero, one, or many records in one table can match zero, one, or many records in the other:

- **Students in courses:** If you create a database to keep track of students in a school, many students are in each class, and each student takes many classes. You have many records in the Students table matching one record in the Courses table. You also have many records in the Courses table matching one record in the Students table.
- **Committees:** If you set up a database for a club or religious group, you may want to keep track of who is on what committee. One person can be on lots of committees, and one committee can have lots of members. The relationship between the People table and the Committees table is many-to-many.
- **Books and authors:** One book can be written by a group of authors (such as this book). And one author can write many books. The relationship between the Books table and the Authors table in a bookstore inventory database can be many-to-many.

Figure 4-3 shows a many-to-many relationship between students and courses. Each student is in several classes; each course has its own bunch of students.



Students

First Name	Last Name
Stuart	Williams
Neil	Richards
Gillian	Young
Tom	Jones
Meg	de Sousa
Zac	Arnold
Parker	Laighton
Mason	Thaxter

Courses

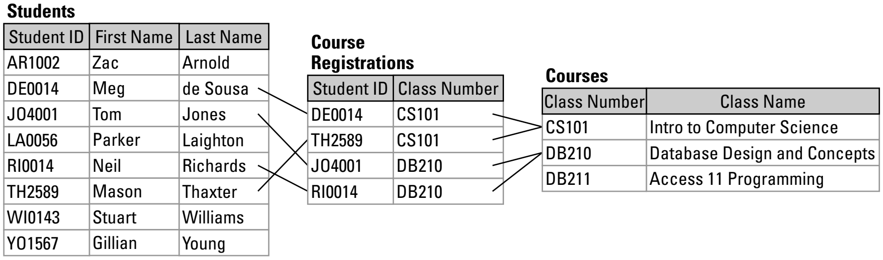
Class Number	Class Name
CS101	Intro to Computer Science
DB210	Database Design and Concepts
DB211	Access 11 Programming

Figure 4-3: Many students can be in each course, and each student can take many courses.

The problem is that Access (and most other relational-database programs) can't handle many-to-many relationships. Access refuses to accept that these relationships exist. (Don't we all know people like that?) But don't worry — you can work around this problem. You can create an additional table that saves the day: The new table records the *connections* between the two tables.

In the students and courses example, you can make a new table called Course Registrations. This new table is called a *junction table*. Each record in the Course Registration table assigns one student to one course. The Students table and the Course Relationship table have a one-to-many relationship: The Students table is the master table and Course Registrations is the detail table. The Courses table and the Course Registrations table also have a one-to-many relationship: Again, the Courses table is the master table. In fact, you probably want that table anyway, because you need some place to record the student's grade in that course. (We frequently find that the new junction table is useful anyway.)

Figure 4-4 shows the relationships among the three tables: Students, Course Registrations, and Courses. To provide a single primary key field that uniquely identifies each student, we added a Student ID field to the Students table. Each record in the Course Registrations connects one student (by Student ID) to one course (by Class number). In real life, we'd add fields for the student's grade, payment date, and other information about the student's enrollment in the course.



Students

Student ID	First Name	Last Name
AR1002	Zac	Arnold
DE0014	Meg	de Sousa
JO4001	Tom	Jones
LA0056	Parker	Laighton
RI0014	Neil	Richards
TH2589	Mason	Thaxter
WI0143	Stuart	Williams
YO1567	Gillian	Young

Course Registrations

Student ID	Class Number
DE0014	CS101
TH2589	CS101
JO4001	DB210
RI0014	DB210

Courses

Class Number	Class Name
CS101	Intro to Computer Science
DB210	Database Design and Concepts
DB211	Access 11 Programming

Figure 4-4: To store a many-to-many relationship, create a junction table that connects the two tables.

Designing a Database

When you feel at ease with the concepts of tables, fields, and relationships, you're ready to design your own relational database. The rest of this chapter walks you through designing your database tables so your database is easy to use, flexible, and efficient. We use the example of a bookstore as we go through the steps to show you how designing works.

Identifying your data

Find out what information is available, who maintains it, what it looks like, and how it is used. Make a list of the possible fields (don't worry yet about which fields end up in which tables). For example, a bookstore needs to track product descriptions, prices, purchase dates, customer names, who bought what, shipment dates (for online orders), and other information.

Eliminating redundant fields

Look over the fields you identified — make sure they're all actually *needed* for your application. Is each piece of information something that may appear on a form or report later, or be needed to calculate something? If not, throw it out.

In this case, it's worth repeating: *Don't store the same information in more than one place.* In a database, redundant information makes double the work when you're updating the information. Instead, figure out the right place to store the information, and store it there — once. If you can calculate one field from another field, then store only one. For example, storing both age *and* birth date is pointless; a person's age changes — the birth date doesn't. Store the birth date; you can always get Access to do the math for you.

The same is true for information that you can look up. For codes of all types (such as state and province codes, product codes, and the like), make a table for the code that includes a field for the code and a field for the code's meaning. Then all the other tables in your database store only the code — and Access looks up the code's meaning *when you need it to appear* in a form or report. For the online bookstore, you don't need to store the title and author of each item that a customer buys; instead, you can just store the ISBN (unique book number) of each book.

TIP

On the other hand, sometimes you can't avoid redundancy. For example, an item of information may change in one place but not in another, so you may have to store it in more than one place. In the bookstore system, when the price of a book changes, the amount that the previous customers paid for the book hasn't changed. In addition to storing the book's current selling price, you may want to store the book's price in the record for each sale.

Organizing fields into tables

Okay, you have a bunch of fields. Are they all in one table, or should you set up multiple tables?

One way to tell whether your system needs multiple tables is to check whether you have different numbers of values for different fields. Say the bookstore carries 200 different products (mainly books, we assume) and you have about 1,600 customers. You have 200 different product names, prices, and descriptions — while you have 1,600 different customer names, addresses, and sets of credit-card information. Guess what — you have two different tables: a Products table with 200 records and a Customers table with 1,600 records.

You could start out with a design like this:

Products	*Customers*
ISBN or Product Code	First Name
Title	Last Name
Author	Street Address
Publisher	City
Pub. Year	State/Province
Price	ZIP or Postcode
Cover Photo	Payment Method
Taxable (Yes/No)	Credit Card Number
Shipping Weight	Credit Card Exp. Date
Vendor Name	Check Number

Products	*Customers*
Discontinued?	Tax Exempt (Yes/No)
Product Type	Book 1
Product Notes	Book 2
	Book 3
	Shipping Cost
	Sales Tax
	Total Price
	Purchase Date

In this case, you'd soon realize that one customer can make more than one purchase. Combining customer information with purchase information won't work — what happens when a customer buys something else? So you leave information about the customer in the Customers table — all the facts about the customer that don't change from one purchase to the next — and move information about a specific purchase into a separate Orders table, like this:

Customers	*Orders*
First Name	Customer First Name
Last Name	Customer Last Name
Street Address	Purchase Date
City	Book 1
State/Province	Book 2
ZIP or Postcode	Book 3
Phone Number	Shipping Cost
Tax Exempt (Yes/No)	Sales Tax
	Total Price
	Payment Method
	Credit Card Number
	Credit Card Exp. Date
	Check Number

But wait — what if the customer buys more than three books at a time? (We usually do.) And if you own the bookstore, you don't want to put an arbitrary limit on how many items your customer can buy. (Limit your profit for the sake of your database? In a word, nope.) Any time your database design includes a bunch of fields that store essentially the same kind of information (for example, `Book 1`, `Book 2`, and `Book 3`), something is wrong. An order can consist of zero, one, or many books — does that sound familiar? Yes, a one-to-many relationship exists between an order and the items in that order, so you need to make a separate table for the individual items, like this:

Orders	*Order Details*
Customer First Name	ISBN
Customer Last Name	Quantity
Purchase Date	Price Each
Total Product Cost	
Shipping Cost	
Sales Tax	
Total Price	
Payment Method	
Credit Card Number	
Credit Card Exp. Date	
Check Number	

Now each time a customer places an order (or comes into your store to make a purchase), you create one record in the Orders table, along with one record for each item purchased in the Order Details table. The Order Details table has room to store the quantity of that item, in case the customer wants more than one of something. (We're sure you want to buy a copy of this book for everyone you know, right?) You should also store the selling price of the book. Access can calculate the cost of that quantity of each book (price × quantity), so you don't need to store that information.

The following are really good reasons *not* to store multiple fields (such as `Book 1`, `Book 2`, and `Book 3`) in one table, and to create a separate table instead:

- **You can't anticipate the right number of fields.** If someone buys more than three things (as in this example), you have to create a separate order and enter everything twice.
- **You can't analyze the information later.** What if you want to see a list of everyone who bought the last *Harry Potter* book, so you can notify them that the next one is coming out? If you have multiple fields for this information, your query needs to look for orders that contain a *Harry Potter* book in `Book 1` or `Book 2` or `Book 3`. What a pain.

TIP

We don't want to drive this into the ground, but creating multiple, identical fields is a problem that many first-time database designers make for themselves. Be good to yourself and don't do it!

Add tables for codes and abbreviations

Look at your tables to see whether the fields contain any standard codes, such as two-letter state and province codes, ZIP codes, or other codes. For example, the bookstore's Customers table includes a `State/Province` field and a `ZIP/Postcode` field. The Products table contains a `Product Type` field so the bookstore can track sales of books (type `B`) versus other types of stuff (such as, `F` for food or `A` for audiotapes). Determine whether your system needs to do one of these tasks with the codes:

- **Validate the codes.** Wrong codes cause trouble later: Validating the codes when you type them in is always best. If someone types *VR* for Vermont, the post office may not deliver your package. And later, when you analyze your sales by state, you have some Vermonters with the right code (VT) and some with the wrong code.
- **Look up the meaning of the code.** Codes usually stand for something. Should your system print or display the meaning of the code? If you have a report showing total sales of products by type, printing `Books`, `Food`, and `Audiotapes` (rather than `B`, `F`, and `A`) is nice.

If you want to either validate or look up the codes you store, create a separate table to hold a list of your codes and their meanings. For example, you could add the following two tables to the bookstore database:

States	*Product Types*
State Code	Product Type Code
State Name	Product Type Description

TIP

Although ZIP codes and postal codes *are* codes (well, yeah), most databases don't include tables that list them. The reason is simple: Pretty soon your system would be overstuffed with them (about 100,000 ZIP codes exist, for openers). Plus you have to update the table constantly as the post offices issue — and change — ZIP and postal codes. If you *really* want to validate your ZIP codes, you can buy a ZIP code database from the U.S. Postal Service at `www.usps.com`.

Choosing keys for each table

The next step in designing your database is to make sure each table has its own primary key field(s). Each table needs one or more fields that uniquely identify each record in the table. Look for a field in the table that has a different value in each record. For example, in the Products table, each book has a unique ISBN (International Standard Book Number) — for a convenient example, look on the back of this book and you can find its ISBN just above the bar code. If your bookstore sells stuff other than books — say, book-marks, espresso, and expensive little pastries — then you can make up codes for them. If one field is different for every record in the table, you've found your primary key field. For lists of codes, the code field is the key.

Autonumbering your records

Well, okay, you may not find a unique field. It happens — tables that list people (such as the Customers table) can pose such a problem. Some people have the same name; family members or roommates can share an address and phone number. Most businesses end up creating and assigning unique numbers to people to avoid this problem. (For privacy reasons, don't even *think* of asking for anyone's Social Security number. Make up your own customer number!)

Fortunately, assigning each record in a table a unique number is easy in Access: Just add an AutoNumber field to the table, and Access numbers the records as you enter them. In your bookstore system, you can add a `Customer Number` field to the Customers table.

The advantage of using an AutoNumber key as the primary key field is that you can't change its values. After you relate two tables by using an AutoNumber field as the primary key, breaking the relationship between the tables if you have to edit the value of the AutoNumber field later is impossible.

For the Orders table, you can use `Customer Number` (instead of the customer's name) to identify who places the order. However, because one customer may make several purchases, you still don't have a unique key for the Orders table. One solution is to use a combination of fields as the primary key. How about using the `Customer Number` and `Purchase Date` fields together as the primary key? This solution works fine as long as a customer doesn't make two orders on the same day. (Hmm, that may not work — people sometimes forget to buy everything they need, and come back later for one or two more items. Instead, you can add an AutoNumber field to this table to provide a unique Order Number.)

Two key fields are sometimes better than one

Sometimes using a combination of fields works fine. In the Order Details table, you'd better add a field for the Order Number, so you can get immediate access to whatever order contains these items. You don't need to add a `Customer Number` field in this case; after you identify the Order Number, Access can look up the Customer Number and other customer information.

The Order Number doesn't uniquely identify records in the Order Details table because one order can (and a bookseller would really love it to) include lots and lots of books. Use a combination of the `Order Number` and the ISBN as the primary key for the table — that way one order includes one entry for each book purchased.

A sample order-entry database design

Here is the new, improved table design for a bookstore system, with asterisks by the primary key fields:

Products	*Customers*
* Product Code (ISBN)	* Customer Number
Title	First Name
Author	Last Name
Publisher	Street Address
Publication Year	City
Price	State/Province
Cover Photo	ZIP or Postcode
Taxable (Yes/No)	Phone Number
Shipping Weight	Tax Exempt (Yes/No)
Vendor Name	
Discontinued (Yes/No)	
Product Type	
Product Notes	
Orders	*Order Details*
* Order Number	* Order Number
Customer Number	* Product Code (ISBN)
Purchase Date	Quantity
Total Product Cost	Price Each
Shipping Cost	
Sales Tax	
Total Price	
Payment Method	
Credit Card Number	
Credit Card Exp. Date	
Check Number	
States	*Product Types*
* State Code	* Product Type Code
State Name	Product Type Description

Linking your tables

If you end up with only one table, you can skip this step — but that situation is fairly rare. Almost every database ends up with a second table at the very least — to contain those pesky codes.

Look at the tables in your database and see which tables contain fields that match fields in other tables. Determine whether there's a one-to-one, one-to-many, or many-to-many relationship between the two tables (as described in the section "What Are Relationships?" earlier in this chapter). For each pair of related tables, you can determine which fields actually relate the tables by following these guidelines:

- **One-to-many relationships:** Figure out which is the "one" (master) and which is the "many" (detail) table in this relationship. Make sure that the detail table has a foreign key field (or fields) to match the primary key field(s) in the master table. The Customers and Orders tables have a one-to-many relationship in the bookstore example — because a customer may have no, one, or many orders. (Okay, someone who has no orders is technically not a customer but still counts as a one-to-many relationship.) The primary key field in the master table (Customers) is `Customer Number`. To relate the tables, the Orders table has to have a `Customer Number` field as the foreign key.
- **One-to-one relationships:** Make sure both tables have the same primary key field(s).
- **Many-to-many relationships:** Access can't store a many-to-many relationship directly. Set up a junction table to connect the two tables, containing the primary keys of the two tables. In the bookstore example, the Orders and Products tables have a many-to-many relationship: One order can have many products and one product can occur in many orders. The Order Details table provides the junction table, which contains the primary key of the Orders table (`Order Number`) and the primary key of the Products table (`Product Code` or `ISBN`). This junction table can also include additional information (the Order Details table includes the quantity of the book that's ordered, as well as the price of each book).

The related fields don't need to have the same name in the two related tables. But the types, lengths, and contents of the fields have to match. (We usually find the two fields having the same names less confusing — preserving sanity is also good for business.)

Refining your links

The relationships between your tables can be a bit more complex — what relationship isn't? — so you may need to make a few more decisions about how your table relationships work:

- **Referential integrity:** This nifty feature means you can tell Access not to allow a record to exist in a detail table unless it has a matching record in the master record. For example, if you turn on referential-integrity checking for the relationship between the Customers and States fields, Access won't allow you to enter a record with a State/Province code if the code doesn't exist in the `State Code` field of the States table. It's a "No bogus codes!" rule, and doesn't require any programming (as you find out in Book II, Chapter 6).

- **Cascading updates:** Another way-cool Access feature updates detail records automatically when you change the matching master record. For example, if you find out that you have the wrong ISBN for a book and you change it in the `Product Code` field in the Products table, you can configure Access to update the code automagically in the Order Details table.
- **Cascading deletes:** As with cascading updates, this feature deletes detail records when you delete the master record.

  This feature is a bit more dangerous than cascading updates, and you may not want to use cascading deletes for most related tables. If a book goes out of print and you stop carrying it, deleting it from the Products table is a bad idea. Consider: What's supposed to happen to all those matching records in the Order Details table (assuming that you sold *some* copies of the book)? Don't delete the Order Details records — because then it looks like you never sold those books. Instead, mark the book as *unavailable* (in our example, set the `Discontinued` field to `Yes`) and leave the records in the tables.

Now you have a fully relational database design. The last step is to clean up the loose ends.

Cleaning up the design

You have tables, you have fields, and you have relationships. What more could you want in a database design? You're almost done. Look at each field in each of your tables and decide on the following for each field:

- **Data types:** The section, "Data types," earlier in this chapter describes the types of information you can store in Access fields. Decide what kinds of information each field contains, how large your Text fields need to be, and what kinds of numbers your Number fields hold. (Book II, Chapter 1 explains the sizes of Number fields.) Make sure to use the same data type and length for related fields. For example, if `Product Code` is a Text field that is 10 characters long in the Products table, make it the same length in the Order Details table.

  If you use an AutoNumber field as the primary key in a master table, use a Long Integer Number field for the foreign key in related tables. What is a foreign key? A foreign key is a special kind of field in a relational table. A foreign key matches the primary key column of another table and can be used to cross-reference tables or ensure that the value in a child table has a parent in the parent table.

- **Validation:** You can set up validation rules for Text, Number, and Date/Time fields, as described in Book II, Chapter 5. Think about limits on the legal values for the field. For example, you may want to specify that the `Price` field in the Products table can't be over $200, or that the `Publication Year` field must be between 1500 and 2100. (This rule should work unless you run the bookstore for Hogwarts Academy.)
- **Defaults:** Some fields have the same value for most records. For example, the `Discontinued` field in the Products table will be NO for most records. (How often would you type in an item that's already discontinued?) You can set the default value — the value that the field starts out with — to the most common value; you have to change it only for the records that have a different value.
- **Indexes:** If you plan to sort your table or search for records based on the values in a field, tell Access to maintain an index for the field. Like the index of a book, a database index helps you (or Access) find information; Access stores information about the field to speed up searches. Access automatically indexes primary key fields and foreign key fields, but you can designate additional fields to be indexed.

That's it! You're done designing your database!

Tips for Choosing Field Types

Here are some guidelines for choosing field types.

Choosing between Text and Yes/No fields

Fields that can have only two values (such as `Yes` and `No`, `True` and `False`, or `On` and `Off`) are also called *Boolean* or *logical* values. You can store Boolean information in a one-letter Text field, using `Y` and `N`. But if you use a Yes/No field, Access can display the information on forms as a check box, option button, or toggle button.

Another advantage of going the Yes/No field route is that you can easily switch between displaying the field as `Yes` and `No`, `True` and `False`, or `On` and `Off` by changing the Format property for the field. Using a custom format, you can choose any two text values to display instead of `Yes` and `No`. You can display the values `Discontinued` and `Available` for a `Yes/No` field.

Choosing between Text and Memo fields

Text fields are limited to 255 characters — if you need more than that, use a Memo field. An Access Memo field can contain over 65,000 characters of textual information — but the extra elbow room costs you some versatility. You can't index Memo fields — and they can't serve as primary or foreign keys. If you plan to sort or search your records using the contents of this field — or use the information in it to relate one table to another — a Text field is usually your best bet. So is brevity.

Some database designers avoid the Memo field altogether, because they find that databases with Memo fields are more likely to get corrupted (become unreadable by Access). The same is true of OLE Object fields (used for storing pictures, spreadsheets, documents, and other large objects) — your database may get indigestion.

Choosing between Text and Number (or Currency) fields

Access displays and sorts Number and Currency fields differently from Text fields. Here are the differences:

- When displaying a Number or Currency field, Access drops any leading zeros (for example, 08540 becomes 8540 or $8,540).
- You can format Number and Currency fields in many ways, giving you control over the number of decimal places, specified currency symbols, and the use of commas. Access can vertically align these fields on the decimal points, which makes columns of numbers easier to read.
- Access can calculate totals, subtotals, and averages for Number and Currency fields, as well as doing other numeric calculations.
- When sorting a Number or Currency field, values sort from smallest to largest (at least they do when you're sorting in ascending order). But when you sort a Text field, values are sorted alphabetically — starting at the left end of the field. This difference means that in a Text field, Access sorts 55 before 6, because the *5* character comes before the *6* character. The following tables show how Access sorts the same list of numbers in Number and Text fields.

Number Sort	*Text Sort*
1	1
2	11
5	2
11	21
21	44
44	5

Secret keys

The primary key field for a table doesn't have to be information that the user sees. In fact, many programmers prefer to use a primary key field that has no other use than to uniquely identify records. If you create an AutoNumber field to act as a primary key field, the user of your database never has to see or type the values of this field.

When you sign in to the Amazon Web site to order a book, you never have to type in your customer number. Instead, you sign in with your e-mail address and Amazon looks up your customer number automatically. Similarly, when you order a book or other merchandise, you never have to type the item number. You just find the item you want and click the Add This Item To My Cart button.

REMEMBER

Use Number fields for all numbers except numeric codes (such as ZIP codes or phone numbers), which are described in the next section. Store any number you may want to add to a total in a Number or Currency field. Choose a Currency field for money values.

TIP

Storing names, money, codes, and other stuff

Now that you know the concepts and procedure for designing a relational database, here are a few suggestions for choosing field types for your information:

- **People's names:** For lists of people, creating a `Name` field and putting full names into it is tempting. Don't do it: You'll want to sort records by last name, or create listings with last name first, or otherwise fool with the format of people's names. Create separate `First Name` and `Last Name` fields.
- **Phone numbers and postcodes:** Use Text fields rather than Number fields, even if you plan to type only digits into the field. The test to use is this: Is there any chance that you'd ever want to do math with this information? If the answer is no, then use a Text field.
- **Money:** Use a Currency field rather than a Number field. Calculations with Currency fields are faster than those with most Number fields.
- **Percentages:** To store percentages, such as a discount, create a Number field and enter decimal numbers between 0 and 1 (inclusive) for percentages between 0 and 100. When you create the table, you can format the Number field as a percent. Then, if you enter a value and habit makes you type **33%**, Access converts the value automatically to 0.33.

- **Pictures:** Access allows you to store pictures in a field — specifically, you use an OLE Object field — but unless the pictures are small, doing so turns out to be a bad idea. The database reacts to a large OLE object like an anaconda trying to swallow a rhino — and its size balloons. If the pictures are small, go ahead and store them in OLE Object fields so everything that makes up the database is in one file. If your pictures are large, if they change frequently, or if you use them for other purposes and need to store them as separate files anyway, store the pathname that leads to the files containing the pictures. In the bookstore example earlier in this chapter, the Products table includes a `Cover Photo` field. Instead of making that field into an OLE Object field, you can store all the cover pictures in a separate folder on the hard drive — and store file names for each picture in a Text field. If the pictures are in various folders, store the entire pathname in the field, as in the following example:

  ```
  D:\Bookstore\Database\Products\Iliad.jpg
  ```

- **Calculations:** Don't create a field that stores the results of calculations that use other fields in the same table. Fields should contain only raw data — Access can do the calculations later. The problem with storing calculated values (other than just plain wasting storage space) is that if the numbers on which the calculation was based happen to change, the calculation is then wrong — which fouls up any calculations or reports based on it. In the bookstore database example, in the Order Details table, you may want to add a `Total Cost` field to contain the `Quantity` field multiplied by the `Price Each` field. However, if the customer decides to change the quantity of items purchased, the calculated amount is then wrong. A better approach is to allow Access to do the work at the last minute — Access can multiply, apply discounts, and sum up totals when you display information or print reports.

- **Codes:** Decide on the formats to use for phone numbers, invoice numbers, credit card numbers, purchase order numbers, and other codes. Decide whether to use all capital letters, and whether to include or omit dashes and spaces. If you ask Access to search for someone with a credit card number 9999–8888–7777–6666 and the card number is stored as 9999888877776666, the search won't find the record.

Storing Single Facts

Some pieces of information exist all by themselves. They aren't part of a list — there's just one item. For example, the name of your organization is a single piece of information, and so is the pathname to the location of your database. If you want these pieces of information to appear on any reports, forms, or queries, or used in calculations or importing, typing them willy-nilly into said reports, queries, or other Access objects is tempting — but in practice this turns out to be a lousy idea.

Here's the problem: What happens when one of these facts changes? Suppose that your organization's name or address changes, or you move your database's location to another folder on another computer. You sure don't want to have to root around your database looking for the places where such information appears.

Instead, create a table called Constants or Facts (or any name you like) *with just one record in it.* Create a field for each piece of information you need to store: maybe your table contains `Our Name`, `Our Address`, `Our City`, `Our State`, `Our ZIP`, and `Our Phone Number` fields. Wherever you want this information to appear (reports, mainly), Access can look it up in your table. Then, if something changes (your telephone area code, most likely), you have to update it in only one place!

Creating a Database

Okay, if you faithfully read this book every night before bedtime — doesn't everybody? — you're 50 pages or so in by now. If you still haven't created your database, enough, already! You're armed with your database design and you're ready to start. (If you haven't been following along, then maybe you'd better review those 50 pages *before* you start.)

When you set out to create a new Access database, you have two options: create it from scratch or use a template.

After you have a beautiful database design (allow us to recommend the — ahem — stellar example in this chapter), you can start with a blank database and create the tables, fields, and relationships. That means running Access without opening an existing database. Follow these steps:

1. **The Microsoft emblem in the upper-left side is a new feature of Access 2007. It's known as the Office Button. You can create a new database by clicking it and choosing New (as shown in Figure 4-5) or by clicking the Blank Database button on the Getting Started with Microsoft Office Access page as shown in Figure 4-6.**

   The File Name task on the right side of the window appears, offering the option of naming the database file in the File Name box (as shown in Figure 4-6). If you don't choose to name the database on your own, Access will name it `Database1.accdb` (or another number, depending on how many databases you have created).

Analyzing your table design

Access comes with a wizard that can eyeball your database design, looking at the way that you divide your information up into related tables. Specifically, it helps you fix a table that contains repeated values in some fields, splitting the table into two or more related tables. The Table Analyzer Wizard (shown in Figure 4-8) walks you through the process, creating the new tables and moving the fields and values. To run the Wizard, simply click the Database Tools tab, and inside the Analyze section choose Analyze Table.

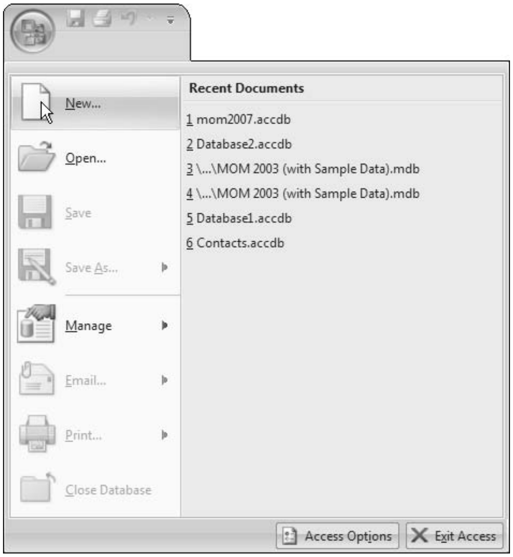
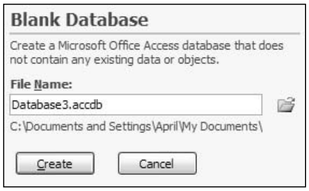


Figure 4-5: Creating a new database


Blank Database

Create a Microsoft Office Access database that does not contain any existing data or objects.

File Name:
Database3.accdb
C:\Documents and Settings\April\My Documents\

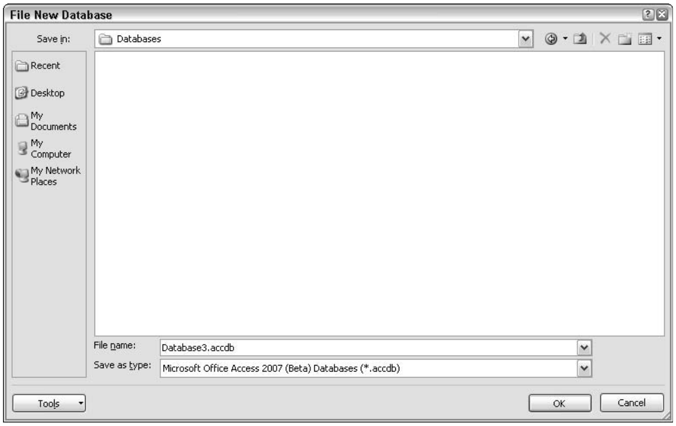
Figure 4-6: File Name link

2. **Navigate to the folder where you want to store the new database, and type the filename into the File Name box. Then click OK.**

   Changing the folder location where you are going to store your database is simple; just navigate through your folder list by clicking the cute little folder icon on the far-right side of the File Name text box in the Getting

Started with Microsoft Access page (see Figure 4-6 again). Figure 4-7 shows you what the new navigation location looks like if you choose to not take the default location for the file. If you are just trying this out, you can use the filename `Test`. Access automatically adds the extension `.accdb` to Access database files.

After you click OK, you see the Database window, as described in Chapter 2 of this minibook.



Save in: Databases

File name: Database3.accdb

Save as type: Microsoft Office Access 2007 (Beta) Databases (*.accdb)

Figure 4-7: New file location change

3. **Create your tables in the Database window.**

   Book II, Chapter 1 tells you how to do this. (You define each of the fields in the database, including the field name, data type, and field length.)

4. **Create relationships between the tables.**

   How to do this is described in Book II, Chapter 6. Access displays a Relationships window that draws lines between related tables.

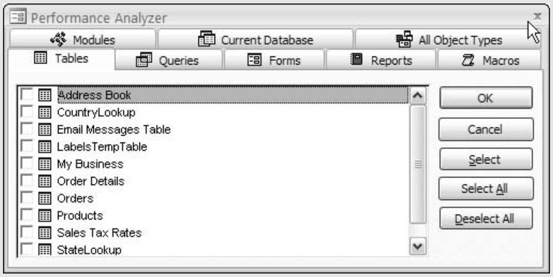
You can always rename the database later. Close the database, and run Windows Explorer by double-clicking My Computer on the desktop or choosing Start➪All Programs➪Accessories➪Windows Explorer. Navigate to the folder that contains the database and find its filename. Then click the filename, press F2, and type a new name for the database file.

See Chapter 2 of this minibook for an account of what happens when you open older Access databases in Access 2007. Note that Access 2003 can't open Access 2007 format databases — if you try, you'll just get an error message.

Analyzing your database performance

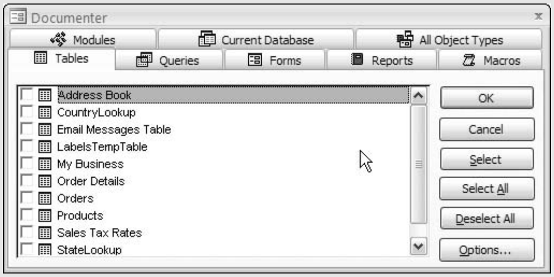
Access 2007 comes with a wizard that can eyeball your database design, looking at the way that you divide your information up into related tables. Specifically, it can help you fix some of the places that it infers ought to be relationships (for more information on relationships, see Book II, Chapter 6) and helps you fix the relationships that it thinks ought to be there.

The Database Performance Analyzer (shown in Figure 4-8) walks you through the process, allowing you to select the things that you want to analyze and helping you create the new relationships. To run the Wizard, simply click the Database Tools tab, and inside the Analyze section choose Analyze Performance.



Database documentation

Access 2007 also comes with a wizard that provides you with documentation on almost any aspect of your new database, helps you to track the changes made to your database, and provides information to your users. The Database Documenter Wizard (shown in Figure 4-9) walks you through the process, allowing you to select the components of your database that you want to create documentation for and then creating that documentation automatically for you. It even allows you to select the format in which that documentation is stored. To run the Wizard, simply click the Database Tools tab, and inside the Analyze section choose Database Documenter.



TECHNICAL STUFF

Naming things (for serious database designers)

If you create a database that is used with larger database systems — such as those running on SQL Server or Oracle — you may want to use a systematic approach to naming the objects in your database. First, omit all spaces in your table and field names, because some database systems can't handle them. Even in Access, avoiding spaces means less typing later on when you create queries, forms, reports, macros, and VBA modules. That's because you won't have to enclose your table and field names in square brackets ([ ]).

Also, don't use words that have specialized meanings to Access, including these words: *Name, Date, Word, Value, Table, Field,* and *Form.* You can actually confuse Access. It's not a pretty sight.

If you really want to impress your programming friends, consider using prefixes on all your object names to show what kind of object you're naming. Here's a set of commonly used prefixes:

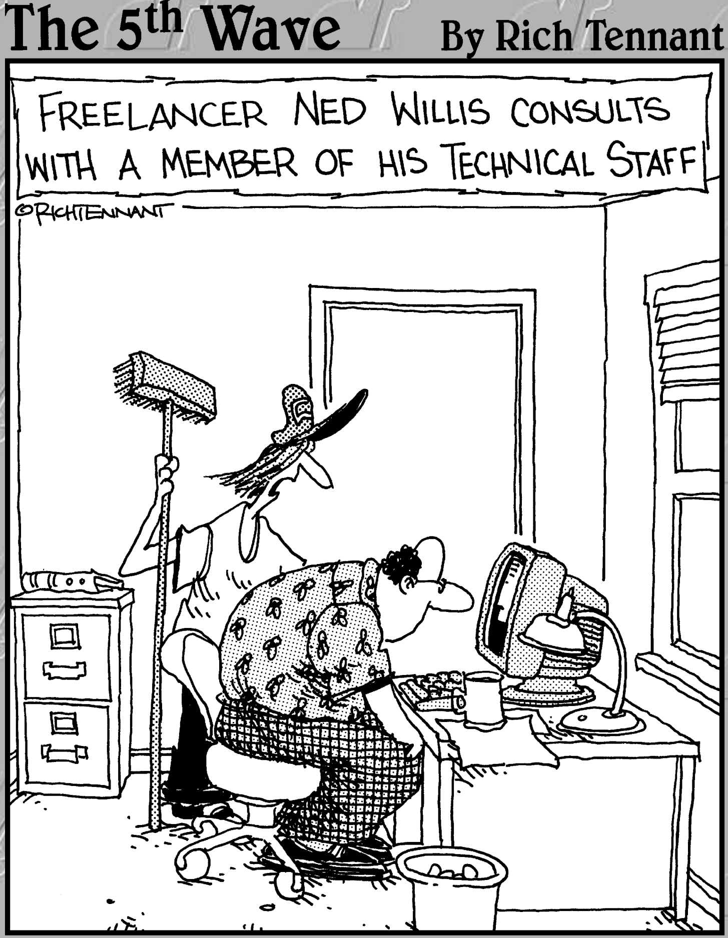
tbl	Table
qry	Query
frm	Form
rpt	Report
mcr	Macro
bas	Module
dap	Data-access page

For example, a serious programmer might rename the Products table as tblProducts.

Fewer programmers use prefixes for fields, to show the data type of each field. If you want to, and if you want to read more about the Reddick VBA Naming Conventions from which these prefixes come, go to the `www.xoc.net` Web site and click the links for RVBA Conventions.

Book II

Tables


The 5th Wave
By Rich Tennant
FREELANCER NED WILLIS CONSULTS WITH A MEMBER OF HIS TECHNICAL STAFF
©RICHTENNANT

"...and that's pretty much all there is to exporting data from a modified table."

Contents at a Glance

Chapter 1: Creating and Modifying Tables

In This Chapter

- **Making tables using the Datasheet view, Design view, and the Table Wizard**
- **Fine-tuning fields using Design view**
- **Defining a primary key**
- **Printing your raw data**

Tables are the most basic building block in your database — they hold the data that you need to save and to analyze. Creating tables and entering data may not be the most glamorous thing you do with your database, but having well-designed tables and correctly entered data makes your database as useful as possible. Before you begin putting data in tables, however, you need to consider the design of your database. Book I, Chapter 4 describes how to design a database — read it before you create a bunch of tables that you then have to reorganize!

This chapter guides you through creating tables and defining fields in Design view. Chapter 2 of this minibook goes into the details you need to know about entering and editing data. The other chapters in this book cover all the other important details that keep your tables — and the data in them — in good shape for use in queries, forms, reports, and the other objects in your database.

If you're a little confused about what fields and records are, refer to Book I, Chapter 4.

About Table Views

To display an already existing table, find the Tables heading at the top of the list in the Navigation Pane, followed by the name of all the tables in the database. Double-click the name of the table you want to display, and the table appears in Datasheet view. (See Book I, Chapter 2 for more information on displaying database objects.) The Field Templates pane also pops up — close it if you aren't using it to create new fields. You'll learn more about field templates later in this chapter.

If you don't see a heading of Tables followed by all the tables in the database in the Navigation Pane, here's how to get a look at them: Right-click the Navigation bar heading, choose Category, then Object Type. Now you should see the objects in the database, sorted by object type.

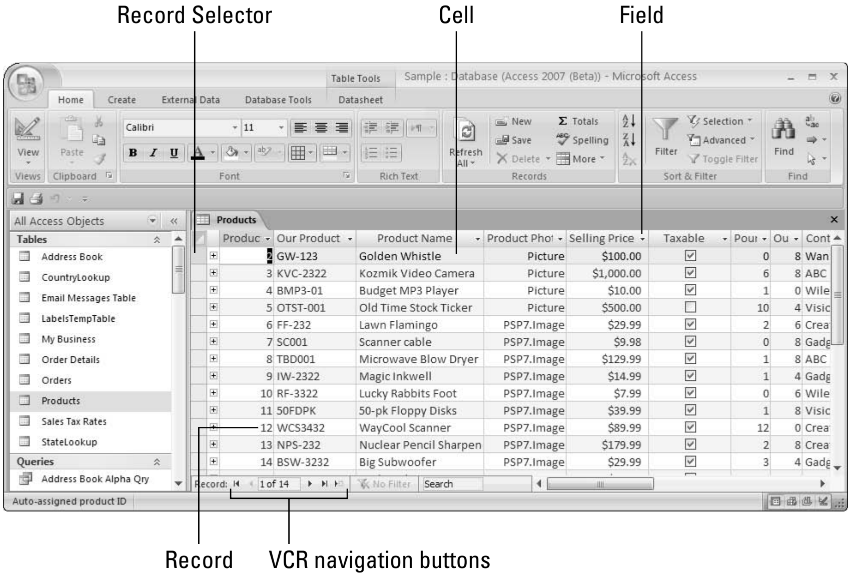
When you look at a table, you probably look at it in one of two views — Datasheet view or Design view. Datasheet view is used for entering and viewing data; Design view is used for refining field definitions and table properties.

Two Pivot views are also available — PivotTable view (covered in Book III, Chapter 4) and PivotChart view (covered in Book V, Chapter 3) — for when you're ready to analyze your data.

Before we start talking about using each view, we want to give you a brief tour, so that you can recognize the elements of each view. To switch between Design view and Datasheet view, use the View options on the Status Bar (look at the bottom-right corner of the Access window). The first View button displays Datasheet view, and the fourth (and last) displays Design view. The two in the middle display pivot views.

Datasheet view

A datasheet shows you data. Datasheet view is similar to a spreadsheet — it displays your data in rows and columns. Rows are the records; columns are the fields. In Figure 1-1 you see a datasheet with all the parts labeled.



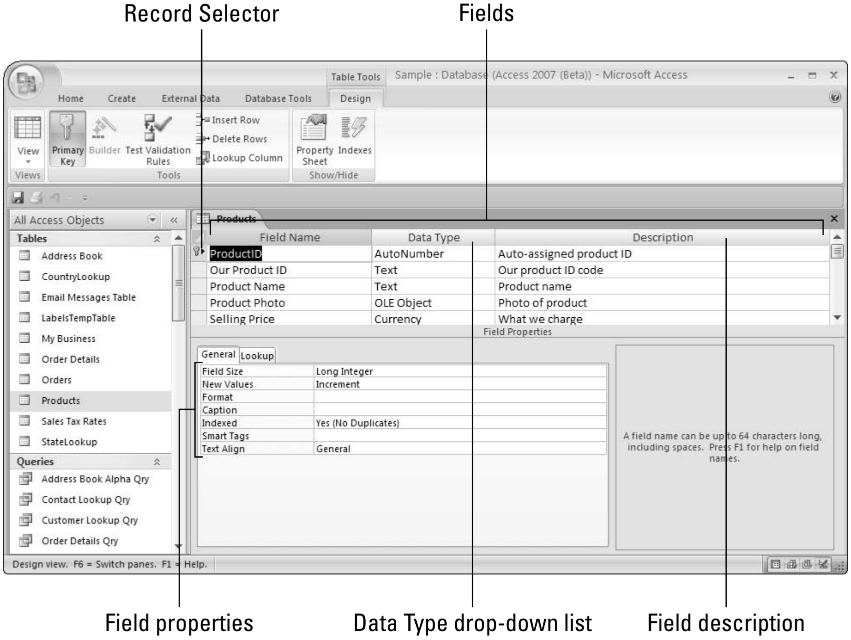
Produc	Our Product	Product Name	Product Phot	Selling Price	Taxable	Pour	Ou	Cont
2	GW-123	Golden Whistle	Picture	$100.00	☑	0	8	Wan
3	KVC-2322	Kozmik Video Camera	Picture	$1,000.00	☑	6	8	ABC
4	BMP3-01	Budget MP3 Player	Picture	$10.00	☑	1	0	Wile
5	OTST-001	Old Time Stock Ticker	Picture	$500.00	□	10	4	Visic
6	FF-232	Lawn Flamingo	PSP7.Image	$29.99	☑	2	6	Crea
7	SC001	Scanner cable	PSP7.Image	$9.98	☑	0	8	Gadg
8	TBD001	Microwave Blow Dryer	PSP7.Image	$129.99	☑	1	8	ABC
9	IW-2322	Magic Inkwell	PSP7.Image	$14.99	☑	1	4	Gadg
10	RF-3322	Lucky Rabbits Foot	PSP7.Image	$7.99	☑	0	6	Wile
11	50FDPK	50-pk Floppy Disks	PSP7.Image	$39.99	☑	1	8	Visic
12	WCS3432	WayCool Scanner	PSP7.Image	$89.99	☑	12	0	Crea
13	NPS-232	Nuclear Pencil Sharpen	PSP7.Image	$179.99	☑	2	8	Crea
14	BSW-3232	Big Subwoofer	PSP7.Image	$29.99	☑	3	4	Gadg

Figure 1-1: Datasheet view.

Use a datasheet to view, enter, edit, and delete data. In Datasheet view, you can also create and delete fields, sort and filter data, check spelling, and find data. Datasheet view is covered in more detail in Chapter 2 of this minibook.

Design view

In Design view, you don't see any data; instead, you define and edit field names and specify the type of data each field holds. You can also provide a field description. Design view also contains field properties — more advanced ways to define fields and help make sure that data entry is accurate. In Figure 1-2 you see a table in Design view, with its various parts labeled.



Field Name	Data Type	Description
ProductID	AutoNumber	Auto-assigned product ID
Our Product ID	Text	Our product ID code
Product Name	Text	Product name
Product Photo	OLE Object	Photo of product
Selling Price	Currency	What we charge

Field Size	Long Integer
New Values	Increment
Format	
Caption	
Indexed	Yes (No Duplicates)
Smart Tags	
Text Align	General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Figure 1-2: Design view.

Saving Your Table

As soon as you enter data, Access saves it. Why do you need to save your tables? That's easy: In order to save both the structure of the table and its field definitions. What you save when you save a table is the table definition, which includes how the table looks in Datasheet view (such as the size and order of the columns) and the information in Design view (the field names, data types, descriptions, and field properties).

Save a table design by using one of these methods:

- Click the Save button (it looks like a disk, and is on the toolbar below the Ribbon).
- Press Ctrl+S.
- Close Design view and click the Yes button when Access asks whether you want to save the table.
- Click the Office Button in the top-left corner of Access and choose Save from the menu.

Then, in the Save As dialog box, provide a name that describes the data stored in the datasheet. Chances are you'll use a table whenever you create other database objects; naming each table descriptively saves you time when you're looking for the data you need later.

Creating Tables for Your Data

REMEMBER

Before you create a table to hold your data, take some time to consider the design of your database — that is, what fields and tables you need — so that your data is well-organized and easy to analyze. (Book I, Chapter 4 has all the information you need to know before you sit down and design your tables.)

After you figure out how to organize your data, you're ready to sit down with Access and create tables. If you are importing data, see Chapter 4 of this minibook for more information.

You need to create a database to hold your tables. Book I, Chapter 4 covers how to create a brand-new database. To create a table, first open the database that you want to hold the table. If you have just created a brand-new database, as soon as you have named the database you will see an empty table to fill in. If you are adding a table to an existing database, using the first group of buttons (the Tables group) on the Create tab of the Ribbon (see Figure 1-3) allows you to create new tables, as follows:

- **Table:** Creates a new, blank table displayed in Datasheet view, allowing you to immediately enter data.
- **Table Templates:** Displays a list of table templates to choose from. Available templates are Contacts, Tasks, Issues, Events, and Assets. Access creates a table with predefined fields into which you can enter data. Field definitions can be edited, and fields can be added or removed to customize the table.

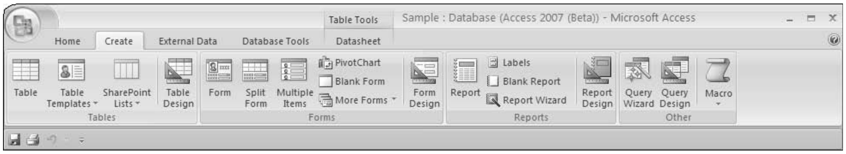


Figure 1-3: Use one of these buttons in the Tables group on the Create tab of the Ribbon to create a new table.

- **SharePoint Lists:** Creates a list on a SharePoint site and a table in the database that links to the newly created list.
- **Table Design:** Creates a new, blank table displayed in Design view, allowing you to define fields.

Notice that you have two options for creating tables from scratch — Table and Table Design. If you want help creating your table, there are an additional two options — one is Table Templates, which allows you to choose from available tables with predefined fields. Another way to get help creating a table is to use Field Templates — predefined fields you can put in any table. (We talk about field templates again when we discuss creating new fields, later in this chapter.)

Don't stress about deciding whether you want to create a table by defining fields in Design view or by entering data in Datasheet view. It's easy to switch back and forth between Datasheet and Design view to define the tables and fields exactly the way you want them.

Creating a new table using a table template

Creating a table with a table template is so easy that there isn't much to say about it. Unfortunately, there are currently only five table templates to choose from, and none of them may be a good match for your data. However, you may want to consider using one of them — even if you have to change field names and definitions a bit — if it seems easier than starting from scratch.

To create a table with a table template, click the Table Templates button in the Tables group on the Create tab to see the five template choices:

- **Contacts:** This template includes fields for `Company`, `First Name`, `Last Name`, `E-mail Address`, `Job Title`, `Business Phone`, `Home Phone`, `Mobile Phone`, `Fax Number`, `Address`, `City`, `State/Province`, `Zip`, `Country`, `Web page`, `Notes`, and `Attachments`. This is a good template to use if you want to store an address book in Access.
- **Tasks:** This template includes fields for `Title`, `Priority`, `Status`, `% Complete`, `Assigned To`, `Description`, `Start Date`, `Due Date`, and `Attachments`. This template can be part of a project management database.
- **Issues:** This template includes fields for `Title`, `Assigned To`, `Opened By`, `Opened Date`, `Status`, `Category`, `Priority`, `Description`, `Due Date`, `Related Issues`, `Comments`, and `Attachments`. This table can store data that records multiple people per record, and tracks assignments with additional information.
- **Events:** This template includes fields for `Title`, `Start Time`, `End Time`, `Description`, `Location`, and `Attachments`. This table is relatively easy to create from scratch, but contains Time fields for storing start and end times of events. It could easily be used for a class schedule, with other tables in the database listing teachers, students, grades, etc.
- **Assets:** This template includes fields for `Item`, `Description`, `Category`, `Condition`, `Acquired Date`, `Purchase Price`, `Current Value`, `Location`, `Manufacturer`, `Model`, `Comments`, `Attachments`, and `Retired Date`. This template is useful for storing data about purchased items. A shopaholic might find it useful therapy!

When you've chosen the template you want to use, wait a second while Access creates the table. Once it's created, you can enter data or change the table (just as you could if you'd created the table yourself).

Creating a new table using Datasheet view

The most straightforward way to create a new table is to create a datasheet and begin entering data. A datasheet looks like a spreadsheet; if you're familiar with Excel or another spreadsheet program, creating a table by entering data into a datasheet may be a good place to start. In a datasheet, fields are columns, and records are rows. (If you're confused by this talk of fields and records, go to Book I, Chapter 4!)

Follow these steps to create a new table in Datasheet view:

1. **Open your database.**

   If you're starting a brand-new database, Access immediately creates a new table in Datasheet view for you. Just skip to Step 4 in this list, and start entering your data!

2. **Display the Create tab on the Ribbon.**

3. **Click the Table button — the very first option on the Create tab of the Ribbon.**

   You see a blank datasheet in Datasheet view, as shown in Figure 1-4. Access names it Table1 (you can change that when you save the table). Access automatically creates an ID field to give each record a unique ID number (this field will get filled automatically).

   Notice that the Datasheet tab on the Ribbon appears automatically when you display a datasheet.

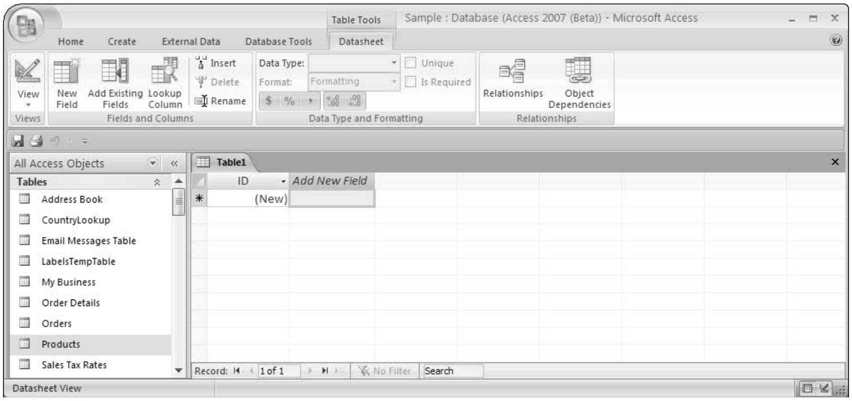


Figure 1-4: A new blank table, ready for data.

4. **Save the table by pressing Ctrl+S.**

   Access displays the Save As dialog box.

5. **Type a name for the table in the `Name` field and press Enter.**

   Use a descriptive name so you can find the table in the future.

Now that you have a table, you may want to do one of the following:

- **Create fields:** By entering data, or by using field templates.
- **Rename fields:** Double-click the field name, type a new name, and press Enter.
- **Enter data:** Press Tab to move from cell to cell. Access automatically saves the data when you move to the next cell. Type Ctrl++ to move to a new record, or use the New Record button at the bottom of the datasheet, or in the Home tab of the Ribbon.

See Chapter 2 of this book for more information about what you can do in a datasheet.

Defining fields

After you've created a table, you're ready to define fields. Each field stores one category of data — for instance, first name, or ZIP code. You may define fields by any of these methods:

- By using field templates
- By entering data and letting Access figure out what kind of data is in each field
- By defining each field yourself in Table Design view.

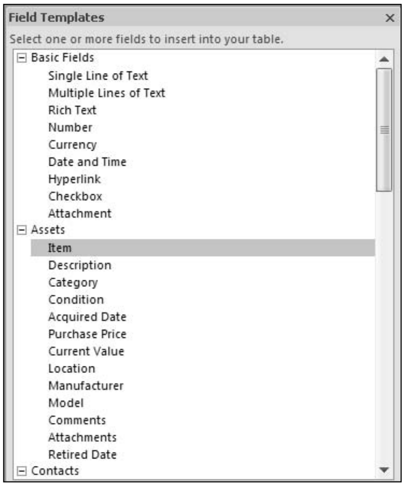
You may also choose to use a combination of all these methods. Using Design view to define fields and field properties is covered in the next section.

Using field templates to create fields

Access 2007 has a number of predefined fields that you can insert into your table. To see the list, click the New Field button in the Fields and Columns group of the Datasheet tab of the Ribbon. The Field Templates box (shown in Figure 1-5) is displayed. Fields are listed in categories. The first category is Basic Fields, and the other categories are based on the tables available as table templates: Assets, Contacts, Events, Issues, Projects, and Tasks.

To put a field based on a field template into your table, first click the column that you want the new field to be to the left of. Then double-click a field name in the Field Templates box to add the field to your datasheet.

The field template defines the data type, format, and may also include field properties. You can make the same changes to a field that you create using a field template that you can make to any field — you can change the data type, the field name, and any field properties.



Field Templates

Select one or more fields to insert into your table.

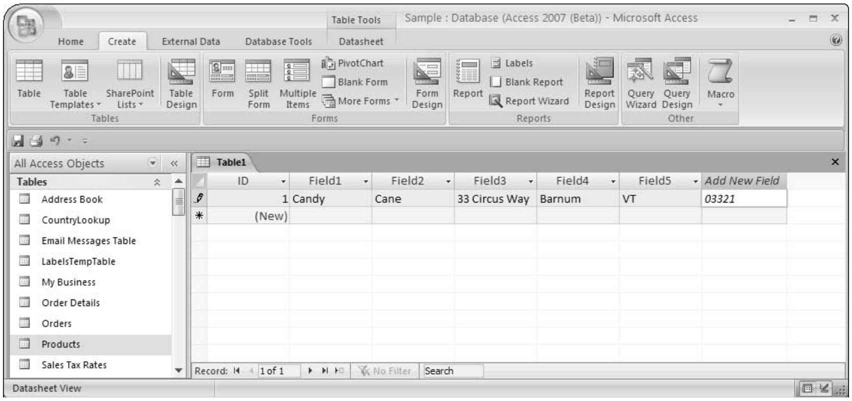
- ⊟ Basic Fields
  - Single Line of Text
  - Multiple Lines of Text
  - Rich Text
  - Number
  - Currency
  - Date and Time
  - Hyperlink
  - Checkbox
  - Attachment
- ⊟ Assets
  - Item
  - Description
  - Category
  - Condition
  - Acquired Date
  - Purchase Price
  - Current Value
  - Location
  - Manufacturer
  - Model
  - Comments
  - Attachments
  - Retired Date
- ⊟ Contacts

Figure 1-5: Double-click a field template to add a field to your table.

Entering data to create fields

Another way to create fields in your table is to enter data. As you enter data, Access determines the data type. When one (or more) record has been entered, you can rename the fields and change any field properties as necessary.

Enter data by clicking on the first cell and starting to type. After each entry, press Tab or Enter to move to a new field. For example, enter a first name, last name, street address, city, state, and ZIP code, pressing Tab to move from one entry to the next. Figure 1-6 shows a table with one record (row) of data entered.



	ID	Field1	Field2	Field3	Field4	Field5	Add New Field
✎	1	Candy	Cane	33 Circus Way	Barnum	VT	03321
*	(New)						

Figure 1-6: Enter data, pressing Tab to move between fields.

Access uses the Pencil icon in the left border of the row (also called the *record selector*) to indicate that you are “writing” — that is, entering or editing — data. Enter data in as many columns as you think you need in the table.

If you decide you need additional fields, you can add them using any of the three methods listed above. For instance, if you created fields by entering data, you may create an additional field using a field template, or by defining it in Design view. Access is very versatile, and doesn’t lock you into one method.

Adding a field from an existing table

If your database contains other tables, you may want to add a field from another table. Although Access 2007 prominently displays the button that allows you to do this, it is actually not a common choice.

Use the Add Existing Fields button in the Fields and Columns group of the Datasheet tab of the Ribbon to display the Field List, shown in Figure 1-7.

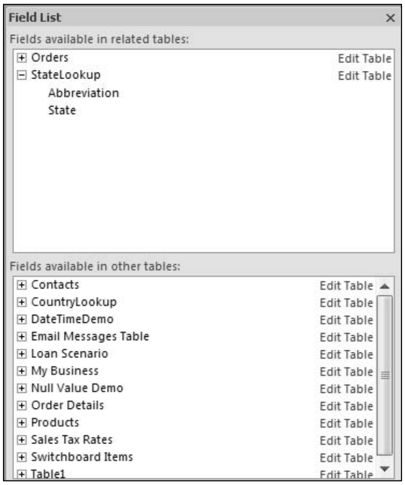

Field List
Fields available in related tables:
⊞ Orders Edit Table
⊟ StateLookup Edit Table
Abbreviation
State
Fields available in other tables:
⊞ Contacts Edit Table
⊞ CountryLookup Edit Table
⊞ DateTimeDemo Edit Table
⊞ Email Messages Table Edit Table
⊞ Loan Scenario Edit Table
⊞ My Business Edit Table
⊞ Null Value Demo Edit Table
⊞ Order Details Edit Table
⊞ Products Edit Table
⊞ Sales Tax Rates Edit Table
⊞ Switchboard Items Edit Table
⊞ Table1 Edit Table

Figure 1-7: The Field List displays existing fields categorized by related tables and other tables.

The Field List displays existing fields in the database categorized by related tables and other tables. Click a plus sign next to a table name to see the fields in that table. Double-click a field name to insert it into your datasheet — the Lookup Wizard runs. The Lookup Wizard creates a relationship between two tables by allowing you to pick values from a field in another table while entering data into the current table. For instance, you could use a lookup list to enter customer names in the table that stores order details. The Lookup Wizard, and lookup lists in general, are covered Chapter 5 in this minibook.

You can also start the Lookup Wizard by clicking the Lookup Column button in the Fields and Columns group of the Datasheet tab of the Ribbon.

Creating tables using Design view

Design view is a good place to create a table if you know a lot about the type of data you put in the table — and you want the fields you create to be designed for the data you have to put into them. If you're creating the table but don't yet have any data, Design view is the perfect place to start. Of course, you can always switch to Datasheet view by clicking the View button on the Home or Design Ribbon to enter data at any time.

Follow these steps to create a table in Design view:

1. **Click the Table Design button in the Tables group on the Create tab of the Ribbon.**

   Access opens a blank table in Design view. Notice the flashing cursor in the first row of the Field Name column.

2. **Type the name of the first field. Press Tab to move to the Data Type column.**

   The field properties for the field fill in automatically, and the data type is set to the Text option.

3. **Select a data type from the Data Type drop-down list.**

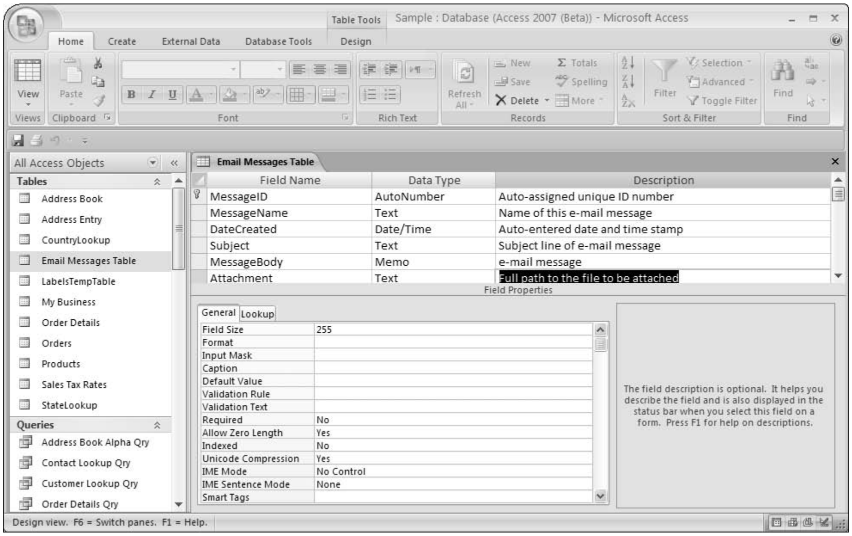
   Common choices are Text, Memo, Number, Date/Time, and Currency.

4. **Type a description of the field in the Description column. (This is optional, but we recommend it.)**

   The description can be especially useful if many people use the database, or if you may not use the database for a while. Use the Description column to explain exactly how you intend the field to be used.

5. **Define additional fields in the table by repeating Steps 2 through 4. You can use Tab to move to the next row where you enter the next field name. Figure 1-8 shows six fields defined.**

6. **Click the Save button or press Ctrl+S to save the table. Type a descriptive name in the Name field and press Enter.**



Field Name	Data Type	Description
MessageID	AutoNumber	Auto-assigned unique ID number
MessageName	Text	Name of this e-mail message
DateCreated	Date/Time	Auto-entered date and time stamp
Subject	Text	Subject line of e-mail message
MessageBody	Memo	e-mail message
Attachment	Text	Full path to the file to be attached

Field Size	255
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	Yes
Indexed	No
Unicode Compression	Yes
IME Mode	No Control
IME Sentence Mode	None
Smart Tags	

The field description is optional. It helps you describe the field and is also displayed in the status bar when you select this field on a form. Press F1 for help on descriptions.

Design view. F6 = Switch panes. F1 = Help.

Figure 1-8: Defining fields in Design view.

7. **When Access asks whether you want to define a primary key, choose Yes or No.**

   Don’t worry; whatever you choose, you can change later. If you feel the need to make an informed decision now, skip ahead to the section, “Defining the Primary Key,” later in this chapter. If you choose to create a primary key now, Access creates a new, numbered field that gives each record a unique number. (The first field shown in Figure 1-8 is an AutoNumber field, defined as the primary key.) If you want to skip this step, be sure you define a primary key manually when you know which field(s) you want to use to uniquely identify each record.

After you have defined the fields in Design view, you have the option of displaying the table in Datasheet view and entering data. Use the Datasheet view button on the status bar at the lower right of the Access window. However, you also have the option of entering data through a form.

Refining Your Table Using Design View

Design view is the place to go when you want to be really specific about what you want a field to hold. Design view also provides some tools you use to make sure that the data entered in a field is what you want it to be — that’s covered in more detail in Chapter 5 of this minibook.

The top part of the Design View window lists the fields in the table, their data type, and a description, if one has been added.

The bottom part of the Design View window displays *field properties* — configuration information about the current field. If you're a novice Access user, don't worry about field properties. You don't have to do anything with them at all; if you do need them at some point, however, we tell you exactly how to use them.

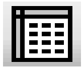
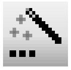
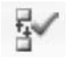
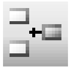
CROSS-REFERENCE

Many (but not all!) tasks you do with Design view can also be done in Datasheet view. Datasheet view is covered in more detail in Chapter 2 of this minibook. The Data Type and Formatting group of the Datasheet tab of the Ribbon contains options for changing the data type, format, and some field properties (Unique and Is Required) for a selected field.

Design view has its own Ribbon of tools — to display them, click the Table Tools Design contextual tab that appears at the end of the Ribbon when Design view is displayed.

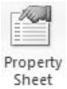
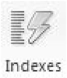
Table 1-1 lists Design view Ribbon tools.

Table 1-1 Design View Buttons and Their Functions

Button	*Name*	*What It Does*
	Primary Key	Makes the selected field the primary key field for the table.
	Builder	This button is grayed out in many contexts (when creating an expression is not an option). Displays the Expression Builder to help you build a field or expression. Available when cursor is in Field Name, Default Value, Validation Rule, or Smart Tags.
	Test Validation Rules	Tests Validation Rules. See Chapter 5 of this minibook for more information.
	Insert Row	Adds a row (field) to the table design where the cursor is, or inserts as many rows as are selected.
Delete Rows	Delete Rows	Deletes the current row, or selected rows of the table design view.
Lookup Column	Lookup Column	Creates a lookup field — that is, a field that lists values stored in another field. See Chapter 5 of this minibook for more information.

(continued)

Table 1-1 ***(continued)***

Button	*Name*	*What It Does*
	Property Sheet	Displays the Properties sheet for the selected field. A properties sheet allows you to set even more controls for the field. (Many of the field properties are covered in Chapter 5 of this minibook.)
	Indexes	Displays the Indexes window with the indexed fields in the table and their index properties.

Choosing field names

When you create fields, give at least a couple of seconds of thought to the name you give them. Although you can change a field name, thinking of the name as permanent is safer. Pick a name that is descriptive, not too long, and easy to figure out. You often see the name without the description when you are building other objects, so naming fields well now saves you time later.

Some fields are used to connect tables — for instance, in your Holiday Gifts database you may have a person's name (or some other unique identifier) in the table for listing addresses, as well as the table for listing the gift(s) you give them each year. Try to use the same name for fields that appear in multiple tables when the field is, in fact, the same. If the field is similar but *not* identical, give it a different name.

Starting every name with a number or a letter, and keeping names to 64 characters or fewer, is a good idea.

TIP

If you are even thinking of using your database in a real SQL environment, don't use spaces in your field names. SQL does not like spaces.

Using the Caption property

Access gives you the option of giving a field a *caption*. A caption is text that is used on the datasheet, forms, and reports instead of the field name. The field name must still be used in expressions and in code.

To give a field a caption, use the `Caption` property in Table Design view.

Changing a field name

In the database-building process, changing field names is easier if you do it sooner rather than later — that is, before you use the field name a zillion times in tables, queries, forms, reports, and in code. Keep a table of old and new names in case any problems crop up.

You can rename a field in a single table, but if you use the field in other places in the database, be sure the Name AutoCorrect feature is on. To see the Name AutoCorrect options, click the Office button in the top-left corner of the Access window, then click the Access Options button at the bottom of the menu. Click Current Database in the Navigation Pane of the Access Options dialog box, and scroll down to see the Name AutoCorrect Options section. There are three Name AutoCorrect box check boxes — be sure the second (Perform Name AutoCorrect) is selected.

To change a field name in Datasheet view, right-click the current name, select Rename from the shortcut menu, type a new name, and press Enter. In Design view, simply edit the current name.

Copying a field

You can copy a field definition easily — be aware that you only copy the definition, not the data. You can even copy a field definition from one table to another — which is an easy way to be sure that related fields have the same definition. Remember, however, that usually only one field needs the primary key designation; be sure to remove it from the other field.

To copy a field, follow these steps:

1. **Click the record selector (the gray box to the left of the field name) to select the field.**
2. **Press Ctrl+C or click the Copy button in the Clipboard group of the Home tab on the Ribbon.**
3. **Move the cursor to an empty row in the table into which you want to copy the field.**
4. **Press Ctrl+V or click the Paste button in the Clipboard group of the Home tab on the Ribbon.**
5. **Type a new name in the Field Name field, if necessary, and press Enter.**

   The field title is highlighted, so when you type a new name, you replace the old name.

Moving a field

To move a field, select the row by clicking the record selector — you can select multiple rows by dragging the row selectors. Then drag the record selector up or down to where you want to drop it. As you move the mouse, a dark horizontal line shows where the row moves when you release the mouse button.

Adding a field

If you want to add a field in the middle of a table in Design view, place the cursor where you want the new field to appear (or select the row) and then click the Insert Rows button in the Tools group of the Design tab of the Ribbon. Rows at and below the cursor are pushed down to make room for the new field.

Deleting a field

You can delete a field in Design view. Deleting a field deletes the field definition and all the data stored in the field.

Follow these steps to delete a field:

1. **Select the field by clicking the record selector (the gray box to the left of the field name).**
2. **Press the Delete key or click the Delete Rows button in the Tools group of the Design tab on the Ribbon.**

   If the field has no data, Access deletes it. If the field has data, you see a dialog box that asks you to confirm that you do, indeed, want to permanently delete the field and its data.

Choosing a data type

Access provides eleven data types for you to choose from. Choose the data type that best describes the data you want to store in the field and that works with the type of analysis you need to use the field for. For instance, storing phone numbers in a text field works fine because you probably never need to add or subtract numbers. Prices, however, should be stored in a Number or Currency field so you can add, subtract, or even multiply them by the number of units ordered and create an invoice.

TIP

A few fields need data type that may not be obvious, mainly telephone numbers and ZIP codes and other such fields. Generally, even though these fields store numbers, you want to set these fields to text data type. Doing so allows you to store leading zeros (so that 021538 doesn't appear as 21538) and add characters such as dashes and parentheses. The Input Mask Wizard (covered in Chapter 5 of this minibook) helps you define fields for phone numbers, ZIP codes, Social Security numbers, and dates. The Input Mask Wizard is also useful for any codes you may use in your database, or other types of fields that may sometimes appear with spaces or dashes or other punctuation (such as credit card numbers) so the data is always entered consistently and you can find it when you need it.

Table 1-2 lists the data types, and describes when to choose each.

Table 1-2 Data Types

Data Type	*What It Holds*	*When to Use It*
Text	Numbers, letters, punctuation, spaces, and special characters (up to 255 characters).	All text fields except really long ones. Also good for ZIP codes and phone numbers. You can't do number-type calculations with a text field.
Memo	Text, and lots of it — up to 65,536 characters.	When you have lots of text, such as comments. Can't be indexed, and can't be a key field.
Number	Numbers. When you select Number type, you may want to change the `Field Size` property to the option that best fits the field. (Field sizes are explained in Table 1-3.)	For numbers that you may want to add, multiply, and do other calculations with. You can also use decimal points, +, and – in a Number field (to designate positive and negative numbers).
Date/Time	Dates and times.	For dates and times. You can do calculations such as finding the number of days between two dates, or adding hours to a time to calculate a new time.
Currency	Numbers with a currency sign in front of them.	When you store currency data, such as prices. Like number fields, a currency field can do calculations. Holds monetary values. Calculations with Currency fields are faster than those with Single or Double Numbers field sizes (the kinds of numbers that can include fractions for cents). Single and Double field sizes for number fields are explained in Table 1-3.
AutoNumber	A unique number generated by Access for each record.	When you want each record to have a unique value that you don't have to type in. The value starts at one and is incremented for each record.
Yes/No	Binary data such as Yes/No, Male/Female, True/False, and so on.	When you have a field that can only have two entries. Appears as a check box on the datasheet; can appear as a check box, option button, or toggle button on forms; can be either "on" or "off." Use the `Format` field property to define the values — for instance, true/false, male/female, available/discontinued.

(continued)

Table 1-2 ***(continued)***

Data Type	*What It Holds*	*When to Use It*
OLE Object	An electronic object such as a picture, a sound, or another object created with OLE-compatible software.	When you want to store something in Access or link to something created and opened with another application. The new Attachment data type is usually preferred over the OLE Object data type.
Hyperlink	URLs, e-mail addresses, and other types of links.	When you want to link to a Web page, e-mail address, or file. See more about hyperlinks in Chapter 2 of this minibook.
Attachment	Use to store one or more attachments (files).	Ultimately requires less database space than OLE. Also, more than one attachment can be entered in a record.
Lookup	Not really a data type — this option runs the Lookup Wizard.	When you want to select a table or a Wizard list to use as a drop-down list for the field.

Some database designers avoid the Memo field altogether, because they find that databases with Memo fields are more likely to get corrupted (that is, become unreadable by Access). The same is true of OLE Object fields, which are used for storing pictures, spreadsheets, documents, and other large objects. The new Attachment data type is a good alternative to the OLE Object type. There is more information on using Hyperlink and Attachment fields in the next chapter.

When to use AutoNumber fields

AutoNumber fields have one and only one purpose: to act as the primary key field for tables that don't have an existing field that uniquely identifies each record. Don't use AutoNumber fields for anything else. In fact, most Access database designers use AutoNumber fields to create primary key fields — and then make sure those key fields never appear on forms and reports.

Here's why the key fields are often hidden: You have no control over the numbers that Access issues when numbering your records. If you start adding a record and then cancel it, Access may decide that particular number is already used — and skip it the next time you add a record. You can't change the AutoNumber field's value. If you need a series of numbers to not end up with holes (skipped numbers), then don't use an AutoNumber field.

If you use an AutoNumber field to keep track of invoices, and it issues your invoice numbers, you end up with skipped invoice numbers. If this isn't a problem for you, fine — make the Invoice Number category an AutoNumber field and print it on your invoices. But if missing invoice numbers is a problem, use a regular Number field for your invoice numbers and don't use the unique AutoNumber field on forms and reports. You may want to use the `Index` field property setting set to **Yes (No Duplicates)** if you want to make sure that each value in the field is unique. Find out more about the `Index` field property later in this chapter.

TIP

If you want to start numbering invoices at 1001 rather than 1, create an `Invoice Number` field. If you want to get fancy, create a macro that automatically fills in the next invoice number in the sequence. But if an incorrect check number gets entered by mistake, you can go back and make changes without changing the value of the primary key field.

Book II
Chapter 1

Creating and Modifying Tables

Formatting Fields with Field Properties

Field properties are generally used for formatting fields. They can also be used to validate data, which we cover in Chapter 5 of this minibook.

Field properties are defined for each field (not surprisingly!). You can only see the field properties for one field at a time. To see the field properties for a field, select the field in the top half of the Design View window. You can select the field by clicking the record selector (the gray box to the left of the row) or by clicking anywhere in the row. The selected field has a triangle arrow to its left. Select a new field to see a whole different set of field properties. The field properties you see depend on the data type of the field — for instance, you won't see the `Decimal Places` property for a Text field.

TIP

Click a field property to see a short description to the right — that tells you if it's a formatting property or a data-validation property (some properties can be used in both ways).

How do you use field properties to format a field? For number fields, you can define the number of decimal places you want to display. For text fields, you can tell Access to change the text to all capital letters or all lowercase. You can even use the `Format` property to add extra characters to a Text or Memo field (although for most applications the Input Mask Wizard is easier to use than the `Format` property — see more about input masks in Chapter 5 of this minibook).

Formatting Number and Currency fields

You can use the `Field Size` and `Format` properties together to define how fields display. The common formats for Number and Currency fields are built right into Access — you can choose from those listed in Table 1-3.

Table 1-3 Number Formats

Number Format	*How It Works*
General Number	Displays numbers without commas — and with as many decimal places as the user enters.
Currency	Displays numbers with the local currency symbol (determined by the Regional settings found in the Windows Control Panel), commas as thousands separators, and two decimal places.
Euro	Displays numbers with the Euro symbol, commas as thousands separators, and two decimal places.
Fixed	Displays numbers with the number of decimal places specified in the `Decimal Places` property (immediately after the `Format` property; the default is 2).
Standard	Displays numbers with commas as thousands separators and the number of decimal places specified in the `Decimal Places` property.
Percent	Displays numbers as percentages — that is, multiplied by 100 and followed by a percent sign.
Scientific	Displays numbers in scientific notation.

WARNING!

The `Field Size` property can affect the format.

You can define your own number format using the following symbols:

#	Displays a value if one is entered for that place
0	Displays a 0 if no value appears in that place
.	Displays a decimal point
,	Displays a comma
$ (or other currency symbol)	Displays the currency symbol

%	Displays the number in percent format
E+00	Displays the number in scientific notation

To create a number format with comma separators and three decimal places, type the following: `###,##0.000`

You can define a numeric format so the format depends on the value. You can define formats for positive and negative numbers, for zero, and for null values (when no value is entered). To use this feature, enter a four-part format into the `Format` property, with the parts separated by commas. The first part is for positive numbers, the second for negatives, the third if the value is 0, and the fourth if the value is null (for example, `#,##0`; `(#,##0)`; `"–"`; `"none"`). Using this type of format, you can display positive and negative numbers in different colors, if you like, such as positive in green and negative in red. Put the desired color in square brackets in the correct section of the expression. The available colors are Black, Blue, Green, Cyan, Red, Magenta, Yellow, and White. In Forms, conditional formatting is available and you can specify an expression to determine format — for instance, displaying unshipped status in red.

TIP

To store percentages, such as a discount, create a Number field with a Single field size (to keep the size of the field small — see the next section) and enter numbers between 0 and 1 (inclusive) for percentages between 0 and 100. When you create the table, you can format the Number field as a percent. When you enter a value, you type **33%** and Access converts the value to 0.33.

Setting the field size

Using the `Field Size` property correctly can keep your database efficient; doing so keeps the field size as small as is practical — making for a smaller, more compact database. For Text fields, the `Field Size` property can also help you screen out incorrect data — if you know that you only need (say) four characters in a certain field, then set the field size to 4. Anything longer produces an error message. (For more about screening out incorrect data, see Chapter 5 of this minibook.)

Using the `Field Size` property for any of your Number fields is a little more complicated, but again, using the shortest practical field size makes your database more efficient. Table 1-4 shows your choices for the field size of a Number field (these are listed from the smallest amount of space required to store each value to the largest).

Table 1-4 Field Sizes for Number Fields

Setting	*What It Can Hold*	*When to Use It*
`Byte` gers less than 256.	Integers from 0 to 255.	Use if values are small inte-
`Integer`	Integers from –32,768 to 32,767.	Use for most fields needing integers, unless you need to store values greater than 32,768.
`Long Integer`	Integers from –2,147,483,648 to 2,147,483,647.	Use when the `Integer` setting isn't enough.
`Single`	Numbers from about –3.4E38 to –1.4E–45 for negative numbers and from about 1.4E–45 to 3.4E38 for positive values. Decimal precision to 7 places.	Use for numbers with decimal values. Holds big numbers and lots of decimal places — `Double` holds even more. Generally speaking, `Single` is sufficient, but you can change the setting to `Double` without losing data.
`Double`	Numbers from about –1.7E308 to –4.9E324 for negative numbers and from about 4.9E–324 to 1.8E308 for positive values. Decimal precision to 15 places.	Any values that `Single` won't hold.
`Decimal`	Numbers from -10^28–1 through 10^28–1 in `.mdb` (Access database) files. Numbers from –10^38–1 through 10^38–1 in `.adp` (Access project) files. Decimal precision to 28 places.	Use for values with lots and lots of decimal places.
`Replication ID`	Globally unique identifier (GUID) used for replication.	Use for an AutoNumber field that is the primary key when you replicate the database and add more than 100 records between replications. (Not a common choice!)

The default field size for Text fields is 255; for Number fields, it's Long Integer. You can change the default size on the Access Options dialog box by clicking the Office button in the top-left corner of the Access window and then clicking the Access Options button at the bottom of the menu. In the resulting Access Options dialog box, click Object Designers in the Navigation Pane. The default field sizes are the first three settings on the dialog box.

You can change a field size after you enter data, but if you shrink the size, any Text data longer than the new setting is truncated and any Number data that doesn't meet the requirements is rounded (if you choose an Integer setting) or converted to a Null setting if the value is too large or small for the new setting.

Formatting Date/Time fields

Access provides the most common formats for dates and times — click the down arrow in the `Format` field property to see the formats. You can also create your own Date/Time format (for online help, press F1 or use the Help button on the toolbar) that provides all the codes you need. Combine them in the same way you combine the text or number codes to define a format.

Formatting Text fields

Use the Field Size and Format properties together to format Text fields. The `Field Size` property limits each entry to the number of characters you specify. You can change the field size from a smaller size to a larger size with no problems. If you change a larger size (say, 20) to a smaller size (say, 10), you lose characters past the 10th character.

You enter symbols into the Format property in a kind of code:

For This Format	***Type This Format Property***
Display text all-uppercase	> (greater-than sign)
Display text all-lowercase	< (less-than sign)
Display text left-aligned	**!**
Specify a color	Enter one of the following colors between `[]` square brackets: **black**, **blue**, **green**, **cyan**, **magenta**, **yellow**, **white**.
Specify a certain number of characters	Enter @ for each required character (see also Chapter 5 of this minibook)
Specify that no character is required	**&**
Display predefined text	**/text** (the `Default Value` property may also be useful). For instance, enter **/NA** to display the text `NA`. Appears in all records until another value is entered.

Defining the Primary Key

The *primary key* is a field in each table that uniquely identifies each record in the field. (Primary keys are described in Book I, Chapter 4, including how to choose which field or fields to use for your primary key.) The simplest primary key field is a counter with a value of one for the first record, two for the second record, and so on. You can create a counter field by using an AutoNumber field. If you allow Access to create a primary key for you, it creates an AutoNumber field.

Another example of a primary key is a Social Security number in a table where each record contains information about a single person and each person is listed only once in the table. Sometimes each record may be uniquely identified by the combination of two fields, such as an item number and the manufacturer. Note that first names and last names may not always be unique!

After you define a field as a primary key, Access prevents you from entering a new record with the same primary key value. When in doubt, an AutoNumber field is a good bet for a primary key, but the AutoNumber field doesn't allow Access to help you avoid repeating data as another field does.

Follow these steps to create a primary key:

1. **Display the table in Design view.**
2. **Click in the row containing the primary key field, or select the row by clicking the record selector.**

   To select multiple rows to create a multiple field primary key, click the first record selector, and then Ctrl+click the record selectors you want for any additional fields.

3. **Click the Primary Key button on the Design tab of the Ribbon or right-click the row selector and select Primary Key.**

   Access displays the key symbol in the record selector for the field.

   REMEMBER

   If you already have data in the field and two records have the same value, you cannot make the field the primary key for the table.

   The primary key field has to uniquely identify each record.

Indexing Fields

When you index a field, Access sorts and finds records faster using the Index field. An index can be based on a single field or on multiple fields. The primary key field in a table gets indexed automatically, and you can choose other fields to index as well.

TIP

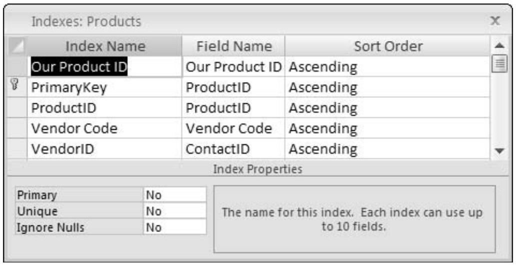
Although indexing speeds up many operations, it slows down some action queries because Access may need to update the indexes as the action is performed.

To index a field, choose one of the `Yes` values for the field's `Indexed` property. Three values for the `Indexed` property are available:

- **No:** Doesn't index the field.
- **Yes (Duplicates OK):** Indexes the field, and allows you to input the same value for multiple records.
- **Yes (No Duplicates):** Indexes the field and doesn't allow you to input the same value for more than one record. The primary key automatically gets this value.

Indexes

You can see details on the indexed fields by clicking the Indexes button to see the Indexes window, shown in Figure 1-9.



Indexes: Products

Index Name	Field Name	Sort Order
Our Product ID	Our Product ID	Ascending
PrimaryKey	ProductID	Ascending
ProductID	ProductID	Ascending
Vendor Code	Vendor Code	Ascending
VendorID	ContactID	Ascending

Index Properties

Primary	No
Unique	No
Ignore Nulls	No

The name for this index. Each index can use up to 10 fields.

Figure 1-9: The Indexes window.

The Indexes window displays all the fields in the table that are indexes, their default sort order (which you can change), and their index properties. The index properties are as follows:

- **Primary:** `Yes` when the field is the primary key for the table, `No` otherwise.

- **Unique:** `Yes` when the value of the field for each must be unique, `No` otherwise.
- **Ignore Nulls:** `Yes` when *nulls* (blanks) are excluded from the index, `No` when nulls are included in the index.

Printing Table Designs

Printing the Design view of your table is not as easy as clicking the Print button — as you may have noticed already, the Print button is not available when Design view is displayed. Luckily, Access includes a cool feature called the *Documenter dialog box* to help you document your database. To print your field definitions with field properties, follow these steps:

1. **Click the Database Documenter button in the Analyze Performance group of the Database Tools tab on the Ribbon.**

   Access displays the Documenter dialog box, as shown in Figure 1-10 (of course, your Documenter dialog box will show different objects).

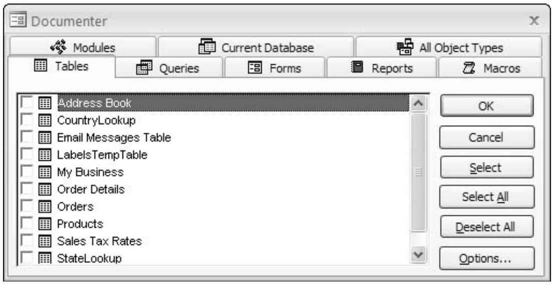


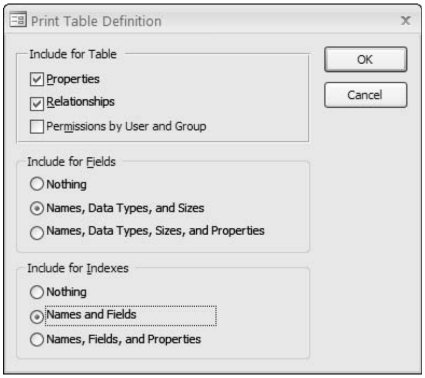
Figure 1-10: The Documenter dialog box displays a tab for each type of object in the database.

2. **Click the Tables tab to display a list of tables in your database.**
3. **Select the table(s) you want to print by clicking the check box in front of the table name.**

   Alternatively, use the Select button to select the highlighted table(s) or just click the Select All button to get the whole enchilada — all the tables.

4. **Click the Options button to display the Print Table Definition dialog box, as shown in Figure 1-11.**

   Use the Print Table Definition dialog box to choose those aspects of the table definition you want to print.



Print Table Definition

Include for Table

☑ Properties

☑ Relationships

☐ Permissions by User and Group

Include for Fields

○ Nothing

● Names, Data Types, and Sizes

○ Names, Data Types, Sizes, and Properties

Include for Indexes

○ Nothing

● Names and Fields

○ Names, Fields, and Properties

Figure 1-11: The Print Table Definition dialog box.

5. **When you're done, click OK to close the Print Table Definition dialog box.**

   The Documenter dialog box makes its return.

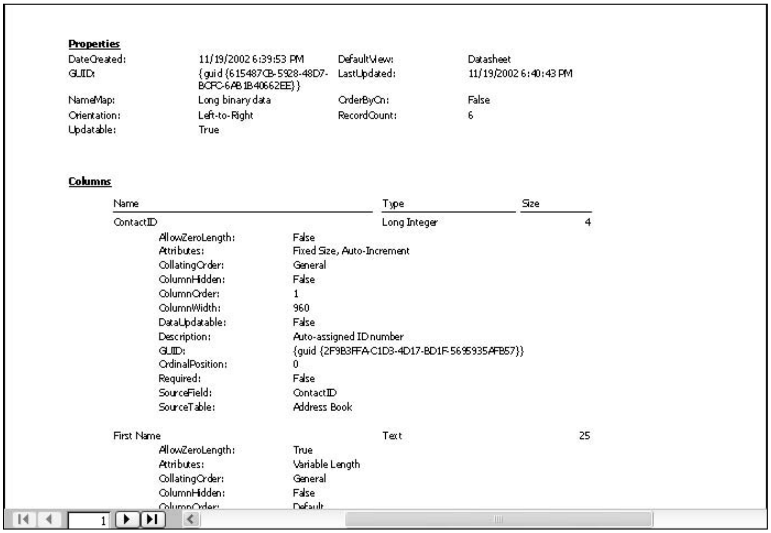
6. **Click OK in the Documenter dialog box to display the object-definition report in a form that can be printed.**

   The contents of the report depend on the settings you selected in the Print Table Definition dialog box, but the default display shows

   - the properties of the table at the top
   - the name of each field with its properties
   - how the table is related to other tables in the database
   - the table index fields
   - the primary key

   A portion of a report is shown in Figure 1-12.

7. **Click the Print button on the toolbar, the Print button on the Print Preview menu, or click the Office Button and choose Print from the menu to print the report.**



```
Properties
DateCreated:        11/19/2002 6:39:53 PM       DefaultView:     Datasheet
GUID:               {guid {615487CB-5928-48D7-  LastUpdated:     11/19/2002 6:40:43 PM
                    BCFC-6AB1B40662EE}}
NameMap:            Long binary data            OrderByOn:       False
Orientation:        Left-to-Right               RecordCount:     6
Updatable:          True


Columns
        Name                                      Type                Size
        ContactID                                 Long Integer           4
                AllowZeroLength:    False
                Attributes:         Fixed Size, Auto-Increment
                CollatingOrder:     General
                ColumnHidden:       False
                ColumnOrder:        1
                ColumnWidth:        960
                DataUpdatable:      False
                Description:        Auto-assigned ID number
                GUID:               {guid {2F9B3FFA-C1D3-4D17-BD1F-5695935AFB57}}
                OrdinalPosition:    0
                Required:           False
                SourceField:        ContactID
                SourceTable:        Address Book

        First Name                                Text                  25
                AllowZeroLength:    True
                Attributes:         Variable Length
                CollatingOrder:     General
                ColumnHidden:       False
                ColumnOrder:        Default
```

Figure 1-12: A sample of a table definition, ready to print.

Chapter 2: Entering and Editing Data in Datasheets

In This Chapter

- **Using datasheets to enter and view data**
- **Navigating a datasheet**
- **Checking spelling in your datasheet**
- **Viewing and using related data**
- **Calculating totals for each field in the datasheet**

All the data in your database is stored in tables, probably in more than one of them. Tables have two views: Design view (covered in Chapter 1 of this book) and Datasheet view, where you see the data in the table. Although you can work in Access without ever looking at a boring datasheet, you should know your way around one, just in case you need to look at one.

Not only do datasheets provide an unadorned view of the data in your table, you can do quite a lot of work in a datasheet. If you enter a lot of data, you may find that you like entering it into a datasheet rather than a form. Using a datasheet, you can:

- modify and delete data
- change the look of the datasheet by moving columns around
- change column width and row height to fit your data
- freeze columns so that they don't scroll off the screen

This chapter covers the basics of working with data in a datasheet. Later chapters in this book cover even more analysis that you can do just by using the datasheet.

TIP

Datasheets are one way to view tables. You can also view queries with datasheets — you see the result of a query in a datasheet. Everything you can do with a table you can also do with a query in Datasheet view.

You can easily view the contents of a table, add new records to the table, and make changes to the data using Datasheet view — the view that shows data exactly as it is stored: in rows (records) and columns (fields). Opening a table in Datasheet view is easy. Just double-click the table's name in the Navigation Pane, or click the View button in the Views group on the Home or Design tabs on the Ribbon when a table is displayed in Design view.

Looking at a Datasheet

A datasheet displays data in a table — it has rows (records), columns (fields), and cells that hold individual pieces of data. Figure 2-1 shows an example of an Access datasheet.

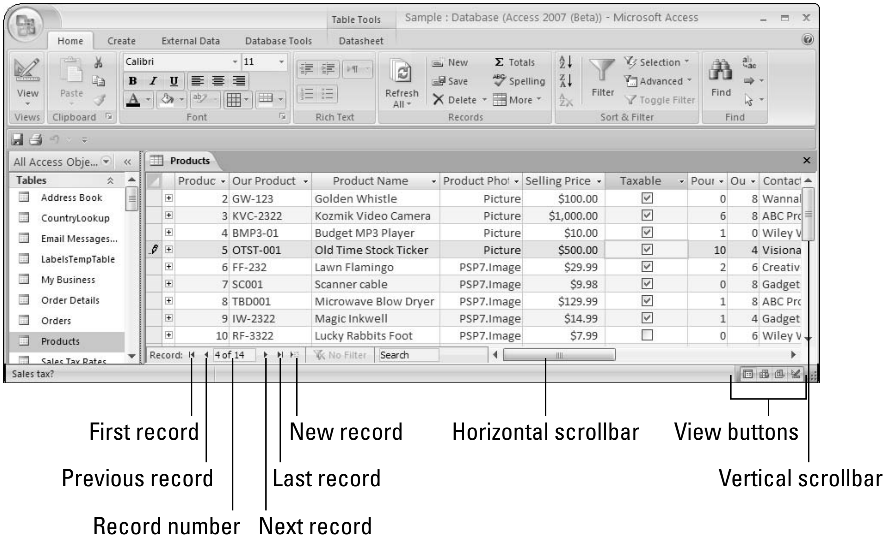


Figure 2-1: A datasheet displays the data in a table in records (rows) and fields (columns).

Produc	Our Product	Product Name	Product Phot	Selling Price	Taxable	Pour	Ou	Contact
2	GW-123	Golden Whistle	Picture	$100.00	☑	0	8	Wannal
3	KVC-2322	Kozmik Video Camera	Picture	$1,000.00	☑	6	8	ABC Prc
4	BMP3-01	Budget MP3 Player	Picture	$10.00	☑	1	0	Wiley V
5	OTST-001	Old Time Stock Ticker	Picture	$500.00	☑	10	4	Visiona
6	FF-232	Lawn Flamingo	PSP7.Image	$29.99	☑	2	6	Creativ
7	SC001	Scanner cable	PSP7.Image	$9.98	☑	0	8	Gadget
8	TBD001	Microwave Blow Dryer	PSP7.Image	$129.99	☑	1	8	ABC Prc
9	IW-2322	Magic Inkwell	PSP7.Image	$14.99	☑	1	4	Gadget
10	RF-3322	Lucky Rabbits Foot	PSP7.Image	$7.99	□	0	6	Wiley V

To see a table in Datasheet view, double-click a table name in the Navigation Pane. If you're looking at a table in Design view, click the View button, the first button on the Home, Design, and Datasheet tabs on the Ribbon, to see it in Datasheet view. The View button allows you to switch between Design and Datasheet views. There is a set of View buttons in the bottom-right corner of the Access window, just in case you find that more convenient. Let the cursor rest on a button to see the button name.

The important buttons in Datasheet view live on two tabs on the Ribbon: the Home tab and the Datasheet tab:

- ✦ The Home tab contains tools to manage the data displayed in the datasheet — use them to cut and paste, change the appearance of data (font, color, justification, and so on.), check spelling, filter the data displayed, and find the specific data you're looking for.

- The Datasheet tab contains tools for manipulating the database through the datasheet — use it to add and rename fields, change the data type and format of a field, and view relationships and object dependencies. If there is something you want to do to the datasheet that you might otherwise do in Design view, the tool for doing it is probably on the Datasheet tab.

Navigating the Data

Moving around in a datasheet is pretty straightforward. Use the vertical scrollbar (refer to Figure 2-1) or the Page Up and Page Down keys to move quickly up and down the datasheet (from record to record). Use the horizontal scrollbar to move from left to right, and press Enter or Tab to move the cursor from field to field.

TIP

If you know the number of the record you want (for example, the fourth record in the table), type the record number into the Record Number box at the bottom of the datasheet (refer to Figure 2-1) to jump straight to the fourth record. Record numbers are relative — records are not assigned a permanent record number. But when you want to go to the fourth record listed on the page, type **4** in the Record Number box and then press Enter. Sorting the datasheet so that records appear in a different order means that the record that is fourth changes.

You can move around in a datasheet three different ways:

- **Mouse:** Click a cell or use the scrollbars.
- **Keys:** Use Page Up and Page Down and the other keys in Table 2-1.
- **Buttons:** Click the VCR-like record-navigation buttons at the bottom-left of the datasheet (refer to Figure 2-1), or you can click the New Record button in the toolbar to jump to the end of your listings.

Table 2-1 Datasheet Navigation Keystrokes

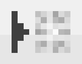
Key	*Where It Takes You*
Page Down	Down a page
Page Up	Up a page
Tab	The next cell
Shift+Tab	The previous cell
Home	The first field of the current record
End	The last field of the current record
Ctrl+↑	First record of the current field

(continued)

Table 2-1 ***(continued)***

Key	*Where It Takes You*
Ctrl+↓	Last record of the current field
Ctrl+Home	First record of the first field (top-left corner of the datasheet)
Alt+F5	Puts the cursor in the Record Number box — type a record number and press Enter to go to that record

Adding and Editing Records



To create a new record, start typing in a blank row. To move to a blank row, press Ctrl+ the plus sign (+) or click one of the two New Record buttons — you find one nestled with the record navigation buttons at the bottom-left of the datasheet and one in the Records group of the Home tab on the Ribbon. Type your data and press Enter or Tab to move to the next field. When you get to the last field of a record and press Tab or Enter, Access automatically moves you to the first field of a new record.

As you enter data, you may come across fields that are check boxes or drop-down lists. You can easily use the mouse to change a check-box setting or select from a list, but you can also use the keyboard — in these ways, for example:

> Press the spacebar to change a check-box setting from checked to unchecked
>
> or
>
> Press F4 to see a drop-down list, press the ↓ key to select your choice, and then press Enter.

If you change your mind about your entry, press the Esc key to cancel it. If you already pressed Enter, you can undo the last entry by clicking the Undo button (a small button on the toolbar under the Ribbon) or by pressing Ctrl+Z. Another useful keystroke to know is Ctrl+' — it repeats the value in the record immediately above the cursor.

Table 2-2 lists all the keystrokes you ever want to use as you enter and edit data.

Table 2-2 Keystrokes in Datasheet View

Keystroke	*What It Does*
Ctrl+ plus sign (+)	Moves the cursor to a new record
Enter or Tab	Enters the data and moves to the next cell (to the right, or to the first field of the next record)
Escape	Cancels the current entry
Undo or Ctrl+Z	Undoes the last entry
F4	Displays a drop-down list (if present) in the current cell
Ctrl+C	Copies the selected data
Ctrl+X	Cuts the selected data
Ctrl+V	Pastes data from the Clipboard
Delete	Deletes the selected data
Ctrl+Enter	Enters a line break within an entry
Ctrl+–	Deletes the current record
Spacebar	Switches between the values in a check box or option button

TIP

Chapter 4 of this minibook covers cutting, copying, and pasting in detail.

Keystrokes that enter data

Access has a few extremely convenient keystrokes that enter data for you, which are listed in Table 2-3. You can also use the Windows cut-and-paste shortcut keys. (Ctrl+C to copy the selected information to the Clipboard, Ctrl+X to cut the selected information and move it to the Clipboard, and Ctrl+V to paste the information from the Clipboard at the current cursor location.) (See Chapter 4 of this minibook for more information on using the Clipboard.)

Table 2-3 Entering Data with Keys

Keystroke	*Data It Enters*
Ctrl+ apostrophe (‘)	Repeats the entry for the field from the previous record
Ctrl+ semicolon (;)	Inserts the current date
Ctrl+Shift+ colon (:)	Inserts the current time
Ctrl+Alt+spacebar	Inserts the default value for a field

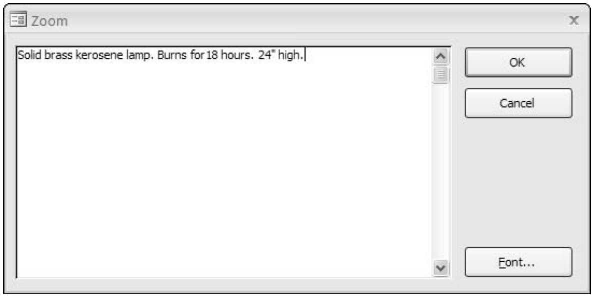
Editing the data you have

Editing is pretty straightforward. To edit data, simply place your cursor in the cell containing the data you want to change, use the Backspace or Delete keys to get rid of unwanted stuff and then type in your replacement stuff. Or, if you already selected (highlighted) the text or a value, whatever you type replaces the selection. If you don't want to replace a selection, press → or F2 or click in the cell to deselect and display the cursor.

Use these tricks when selecting text:

- To replace the entire value, move the pointer to the left of the field until it changes into a big plus sign, and then click to select the whole cell.
- Double-click to select a word or value.
- Click at the beginning of what you want to select, press the Shift key, and then click at the end of what you want to select.

If you have lots of text in a cell and want to see it all at once, select the cell and press Shift+F2 to see the cell in a Zoom box (shown in Figure 2-2). You can make any changes, and then press Enter or click OK to return to the datasheet. Use the Font button in the Zoom box to change the font, and perhaps more importantly, the font size. Any changes you make are retained — the next time you display the Zoom box, you see the data with the new font settings.



Solid brass kerosene lamp. Burns for 18 hours. 24" high.

Figure 2-2: Press Shift+F2 to see the Zoom dialog box.

Table 2-4 lists keystrokes you can use while in editing mode.

Table 2-4 Keystrokes to Use While Editing

Keystroke	*What It Does*
Home	Moves to the beginning of the entry
End	Moves to the end of the entry
← or →	Moves one character to the left or right
Ctrl+ ← or Ctrl+→	Moves one word to the left or right

Keystroke	*What It Does*
Shift+Home	Selects from the insertion point to the beginning of the entry
Shift+End	Selects from the insertion point to the end of the entry
Shift+←	Selects one character to the left
Shift+→	Selects one character to the right
Ctrl+Shift+←	Selects one word to the left
Ctrl+Shift+@ra	Selects one word to the right

Entering and Editing Hyperlinks

Working with fields with the Hyperlink data type can be a little tricky (but doesn't have to be). Fields are defined as hyperlink fields in one of two ways: If you create a table in Datasheet view, and then type in hyperlink data, Access may define the field as a hyperlink field (start Web links with **http://** to have Access recognize them as hyperlinks); alternatively, if you define the field in Design view with the Hyperlink data type, then the field you get is a hyperlink field.

When you type something into a hyperlink field in a datasheet, the text you type instantly turns to a hyperlink — blue, underlined text that you click to go to whatever site the link refers to. You can't click the hyperlinks to edit them — clicking a hyperlink always takes you to the linked file, which can prove tricky.

A hyperlink entry can consist of four different parts:

- The *underlined text* you see in a datasheet or form
- The *address* that the hyperlink links to (the only required part)
- The *sub-address* that the hyperlink links to
- A *screen tip* — text that appears in a small box when the cursor hovers above the hyperlink

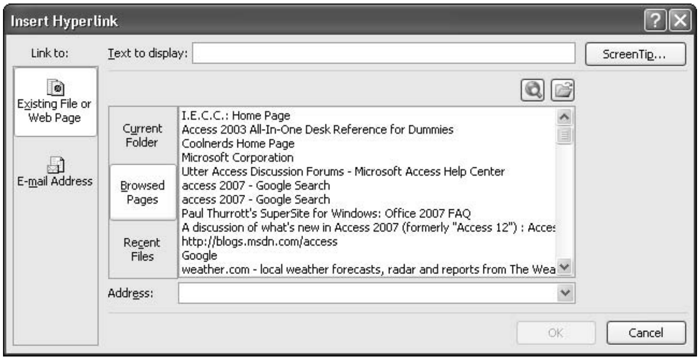
TIP

Because the full hyperlink entry consists of four parts, you may find the Edit Hyperlink dialog box an easier way to enter and edit hyperlinks.

Entering hyperlinks

The most common types of hyperlinks are links to Web pages or to files on your PC or LAN. You can enter those kinds of addresses by simply typing the address or path of the page or file you want to link to (or — an even easier method — paste it from your Web browser or Windows Explorer).

However, you may choose to enter a hyperlink using the Insert Hyperlink dialog box (shown in Figure 2-3) in order to take advantage of the extra features found in this dialog box. To display the Insert Hyperlink dialog box, do one of the following:



I.E.C.C.: Home Page
Access 2003 All-In-One Desk Reference for Dummies
Coolnerds Home Page
Microsoft Corporation
Utter Access Discussion Forums - Microsoft Access Help Center
access 2007 - Google Search
access 2007 - Google Search
Paul Thurrott's SuperSite for Windows: Office 2007 FAQ
A discussion of what's new in Access 2007 (formerly "Access 12") : Acces
http://blogs.msdn.com/access
Google
weather.com - local weather forecasts, radar and reports from The Wea

Figure 2-3: Press Ctrl+K to enter or edit a hyperlink in the Insert Hyperlink dialog box.

- Right-click the hyperlink field and choose Hyperlink⇨Edit Hyperlink from the shortcut menu.
- Click in the field (if empty) or tab to the field and press Ctrl+K.

If a hyperlink is in the field, you can't click it without opening the hyperlink — instead, use the Tab key to move the cursor to that cell, hover the pointer over the upper-right corner of the cell until the pointer changes to a plus sign, and then click, or right-click, to see the shortcut menu.

The Insert Hyperlink dialog box provides different options depending on the type of link you're creating. You can create a link to open any of the following:

- An existing file or Web page
- An e-mail address

Use the buttons on the left side of the dialog box — the ones under the Link To heading — to select the type of link before you enter any additional information about the hyperlink.

The following options always appear in the Insert Hyperlink dialog box, no matter what you end up linking to:

- **Text to Display:** The text that displays as a hyperlink. This does not have to be the hyperlink address.
- **Some way to define the object that you're linking to:** The address or name of the object.

- **Screen Tip:** Click this button to enter text that appears when the cursor hovers over the hyperlink text.
- **Remove Link:** Deletes the hyperlink.

Other options in the dialog box change depending on the type of link you're creating.

If you link to an existing file or Web page, you see browsing options for finding the file or Web page you want the hyperlink to point to:

- The Current Folder button displays the current folder on your PC and allows you to enter a path or browse your PC or LAN.
- The Browsed Pages button displays pages recently viewed with your browser.
- The Recent Files button displays the contents of the Windows Recent Documents folder.
- The Browse the Web button opens your browser.
- The Browse for File button opens the Link to File dialog box, where you can browse to a file.
- The Address option displays the URL of the file or page. Access fills this in automatically as you type, or you can type the address in manually. The drop-down list displays recently used files and URLs.

If you link to an e-mail address, specify the e-mail address and the subject of the e-mail message that is created when the user clicks the hyperlink.

Editing hyperlinks

Editing hyperlinks can be a bit tricky. Unlike other types of fields, clicking a hyperlink doesn't put the cursor in the field in such a way that you can make changes. Instead, clicking a hyperlink takes you to whatever the hyperlink points to. You can't move the cursor around with the mouse! You have to use one of these methods instead:

- Tab to the hyperlink and press Ctrl+K to display the Edit Hyperlink dialog box.
- Right-click the hyperlink and choose Hyperlink⇨Edit Hyperlink from the shortcut menu to display the Edit Hyperlink dialog box.

Using the Edit Hyperlink dialog box, you can either change the text to display or change the address that the hyperlink points to (near the bottom of the dialog box).

You can also edit a hyperlink by tabbing to it and pressing F2, but what you get on-screen is the multipart hyperlink separated by # characters — a bit messy to deal with, to be honest — and you can't use the mouse to move the cursor. The dialog-box method is a more surefire method!

TIP

You can remove a hyperlink by right-clicking and choosing Hyperlink⇨Remove Hyperlink from the shortcut menu. The text and the hyperlink are both removed.

Using the Attachment Data Type

There is a new field type in Access 2007: the Attachment data type. When a field is defined with the Attachment data type, you can store one or more files for each record in the field. For instance, you may store a picture of a person, or files containing correspondence about an order. Attachments can dramatically increase the size of the database, but since the attached file is stored as part of the database, you are not dependent on network drives being available as you would be if you included a hyperlink to the file. As a matter of fact, feel free to delete the original file after you attach it to the database so that you aren't storing it twice.

To use the Attachment data type you must be using 2007, and the database must be in the Access 2007 `.accdb` format. Individual files cannot be more that 256Mb, and all attached files cannot exceed 2 Gb (which is the size limit for an Access database).

Normally, a field holds only a single piece of information for each record. In an attachment field, however, you can store multiple attachments. (Access creates a hidden table to normalize your data).

To create an Attachment field in your table, use one of these options:

- Insert a field based on the Attachment field template into your datasheet (see the previous chapter for details on using Field Templates).
- Define the field data type as Attachment using the Data Type option in the Data Type and Formatting group of the Datasheet tab on the Ribbon, or using the Data Type drop-down list in Table Design view.

In Datasheet view the field appears with a paperclip in the field name box to indicate that the field is an Attachment field. It cannot be renamed in Datasheet view, although the name can be changed in Design view. Each record also contains a paperclip with a number in parentheses. The number indicates how many attachments the record has.

Manage attachments by double-clicking the paperclip for the record to display the Attachments dialog box shown in Figure 2-4.

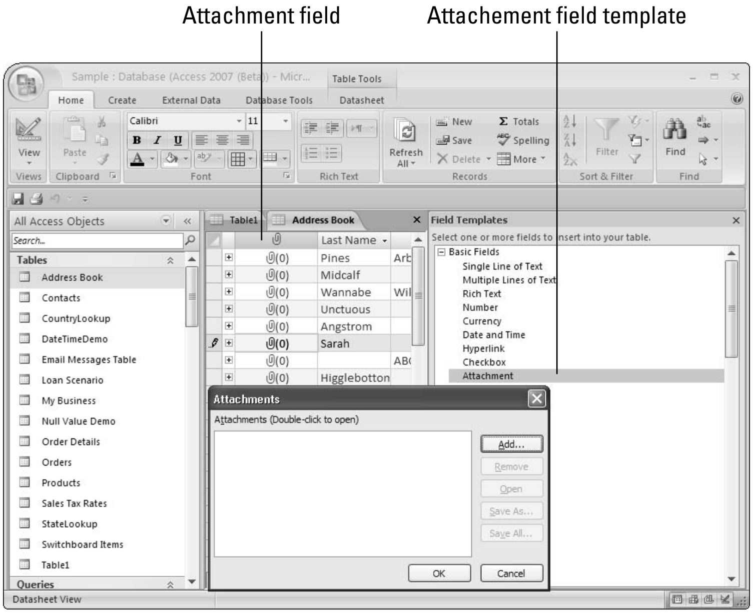


Figure 2-4: Manage attachment fields by using the Attachments dialog box.

Add an attachment by clicking the Add button in the Attachments dialog box. Then navigate to the file and click Open. Repeat to attach more files.

To view an attached file, open the Attachments dialog box and double-click the name of the attached file. It will open in its native application, if the application is available. (For instance, an `.xls` file opens in Excel.) You can make changes to the file and save it. To save files to the database, be sure to return to Access, click OK in the Attachments dialog box, and click Yes when asked if you want to save your updates to the database.

The Save and Save All buttons on the Attachments dialog box allow you to save attachments to your hard drive or another location so that they can be opened without opening the database.

Deleting records

✕ Delete

It's inevitable that sometimes you want to delete data. Before you do that, however, here's a word to the wise . . .

WARNING!

Deleted data cannot be recovered using the Undo button!

With that caveat firmly in mind, you can delete a record by following these steps:

1. **Select the record you want to delete by clicking the *record selector* to the left of it (or by putting the cursor anywhere in the record).**

   Remember that a record is a *whole row* of data.

2. **Press the Delete key or click the Delete Record button.**

   Access asks you if you are sure you want to delete the data.

3. **Click the Yes button to delete.**

   The row you select is deleted, and the data below the deleted row moves up to fill the space.

Entering special characters

Occasionally, you may need to enter characters that aren't on your keyboard. Access doesn't provide an easy way to do that, but you can do it. If you know how to find your special character in another program, you may want to create it in that program first — and then cut and paste it into Access. Otherwise, follow these steps:

1. **Choose Start➪All Programs➪Accessories➪System Tools➪Character Map.**

   The Character Map appears. You see a grid of characters. The drop-down list at the top of the box lists the fonts. The box at the top is where the characters you select (in Step 3) appear.

2. **Browse to find the character you need.**

   Each font has a different set of characters, so you may need to browse through the fonts to find the character you want. Use the vertical scroll bar to see all the characters within a font.

3. **Double-click the character or select it and click the Select button to display it in the Characters to Copy box.**

   Repeat Step 3 until you have all the characters you need.

4. **Click the Copy button.**

   The contents of the Characters to Copy box copy to the Windows Clipboard.

5. **Return to Access and click the Paste button or press Ctrl+V.**

   If you don't see the character you copied, you may have to format it with the font you selected in Character Map.

Checking Your Spelling

You can check your spelling in a datasheet or form by clicking the Spelling button in the Records group on the Home tab of the Ribbon. You can easily skip some fields that may have words that Access doesn't recognize, especially if they are full of codes or abbreviations. (See Table 2-5 on exactly how to do that.) You may also find selecting a field or two to run a spell check on rather than checking the whole datasheet makes sense. (You can select a field by clicking the field name; select several consecutive fields by selecting the first field and, while holding the Shift key, clicking the last field.)

When you spell check, Access compares the words in the datasheet to the words in its own dictionary. Anything not found in the dictionary is "misspelled." Of course, plenty of words that you use may not be in the dictionary, such as technical terms or unique product names. Don't assume that the Spelling dialog box is always right — your spelling may be just fine — checking is a good habit.

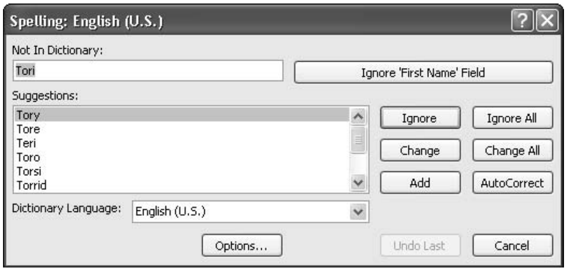
A routine spell check goes like this:

1. **Click the Spelling button in the Records group on the Home tab of the Ribbon to open the Spelling dialog box (shown in Figure 2-5).**

   Access finds the first word that is not in its dictionary, and displays it in the Not In Dictionary box. In the Suggestions box, Access lists possible correct spellings of the word.

2. **You decide how to deal with the word:**

   - Double-click a word from the Suggestions list to replace the misspelled word, or click the correctly spelled word once and then click the Change button.
   - Click the Ignore button to ignore the word and find the next misspelled word.
   - Click the Cancel button to exit the spell check and correct the word in the datasheet manually.


Spelling: English (U.S.)

Not In Dictionary: Tori

Suggestions:
Tory
Tore
Teri
Toro
Torsi
Torrid

Dictionary Language: English (U.S.)

Figure 2-5: The Spelling dialog box helps you find and correct potentially embarrassing typos.

You may want to use the options in the Spelling dialog box listed in Table 2-5 as you check spelling.

Table 2-5 Buttons in the Spelling Dialog Box

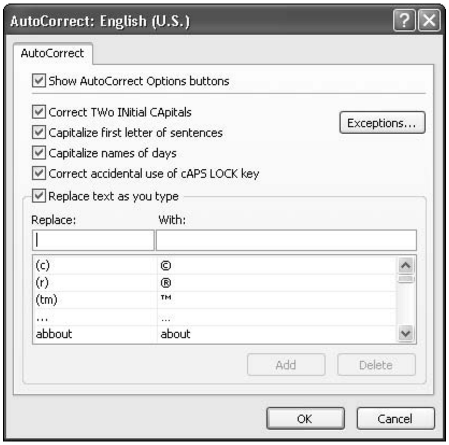
Button	*What It Does*
Ignore "Field name" field	Tells Access not to check spelling in the field where it has found the latest misspelled word.
Ignore	Skips the current word and finds the next misspelled word.
Ignore All	Skips all instances of the word when it's found.
Change	Changes the misspelled word to the word selected in the Suggestions box.
Change All	Changes all instances of the word to the word selected in the Suggestions box.
Add	Adds the word to the dictionary. Use this carefully as it's difficult to undo! Access uses main and custom dictionaries that are shared by all the Microsoft Office applications. You can use Microsoft Word to remove words from a custom dictionary — check Word's online help for details.
AutoCorrect	Adds the misspelled word *and* the correctly spelled word selected in the Suggestions box to the AutoCorrect list. AutoCorrect automatically replaces words when you enter them or press the spacebar.
Options	Displays Access Options; here you can tell Access whether to suggest words, whether to ignore certain words, and which dictionary to use (you can specify a foreign language by using the Custom Dictionary option).
Undo Last	Undoes the last change made by the Spelling dialog box.
Cancel	Closes the Spelling dialog box and retains any changes made.

Using AutoCorrect for Faster Data Entry

AutoCorrect helps you in two distinct ways:

- It corrects misspelled words as you type.
- It replaces an abbreviation you type with more complete text, saving you time.

To change the way that AutoCorrect works, display the AutoCorrect dialog box, shown in Figure 2-6, by following these steps:



☑ Show AutoCorrect Options buttons

☑ Correct TWo INitial CApitals

☑ Capitalize first letter of sentences

☑ Capitalize names of days

☑ Correct accidental use of cAPS LOCK key

☑ Replace text as you type

Replace:	With:
(c)	©
(r)	®
(tm)	™
...	…
abbout	about

Figure 2-6: The AutoCorrect dialog box helps you set up abbreviations for faster data entry.

1. **Click the Office Button (the circle in the top left of the Access window) to display the File menu.**
2. **Click the Access Options button on the bottom bar of the File menu.**

   The Access Options window appears.
3. **Click Proofing in the navigation portion of the Access Options window.**

   Your spelling and AutoCorrect options appear.
4. **Click the AutoCorrect Options button.**

   The AutoCorrect dialog box appears. To turn on AutoCorrect, check to make sure that the Replace Text as You Type option is selected.

To add a common abbreviation to the AutoCorrect list, display the AutoCorrect dialog box and follow these steps:

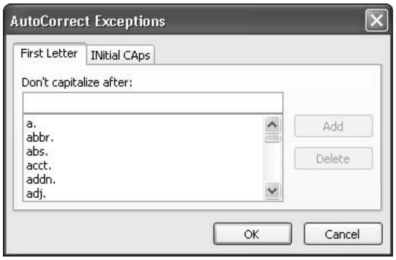
1. **Enter the abbreviation in the Replace box.**
2. **Enter the full term in the With box.**
3. **Click the Add button.**
4. **Check that the Replace Text as You Type option is checked.**

You can delete an AutoCorrect entry by selecting it in the list and clicking the Delete button.

By default, all the options in the AutoCorrect dialog box are on (checked). You may want to turn some or all of them off (unchecked) if Access is making corrections that you don't want it to make.

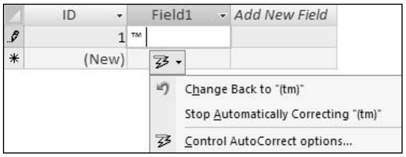
The Exceptions button displays the AutoCorrect Exceptions dialog box (shown in Figure 2-7) where you can tell Access not to capitalize after a period that ends an abbreviation (on the First Letter tab), and when you want two or more initial caps to stay the way you enter them (on the INitial CAps tab).

Figure 2-7: The AutoCorrect Exceptions dialog box makes AutoCorrect more efficient without turning the whole feature off.



When AutoCorrect is turned on, it will check your typing after you press space, Tab, or Enter after typing an error or abbreviation found in the AutoCorrect list. If you have chosen to display the AutoCorrect Options button (the first check box on the AutoCorrect dialog box), you see the button immediately after AutoCorrect has made a correction. Click the button to see the menu shown in Figure 2-8. The menu gives you the option of undoing the autocorrection in this one instance, in all instances, or displaying the AutoCorrect dialog box.

Figure 2-8: The AutoCorrect Options button lets you control each autocorrection.


ID
Field1
Add New Field
1
™
(New)
Change Back to "(tm)"
Stop Automatically Correcting "(tm)"
Control AutoCorrect options...

Formatting a Datasheet

Datasheets can't provide the good-looking output you get with a report or a form, but you can make some changes to make a datasheet more readable and attractive. The formatting options are available on the Home tab on the Ribbon.

TIP

Format changes usually cannot be undone using the Undo button or Ctrl+Z. You can undo changes by closing the table without saving, but of course you lose all the formatting and design changes you made since the last time you saved the table.

Formatting a field

Field formats are covered in detail in the previous chapter, but notice that you can format fields from the datasheet — you don't have to be in Design view. Select any value in a field to format the whole field, then use the Data Type and Formatting options on the Datasheet tab of the Ribbon. If you can't make the change you want to make, check the field properties in table Design view.

Be thoughtful about changing the Data Type — you may want to read the section in the previous chapter about Data Types, as it is possible to lose data when changing the Data Type (Access will warn you first, though).

Use the buttons at the bottom of the section to change the way the data is displayed. You can change numbers to display with a currency symbol, in percentages, or in the comma number format. You can also increase or decrease the number of decimal points displayed using the Increase Decimals and Decrease Decimals buttons.

The Unique check box when checked requires that every value in the field be unique, that is, not repeated in any other record. The Is Required check box makes the field a required entry, and the user cannot continue to the next record until a value is entered for the field.

Changing the font

In an Access datasheet, the font and font size of all the data are the same — you can't change the font for just some of the data.

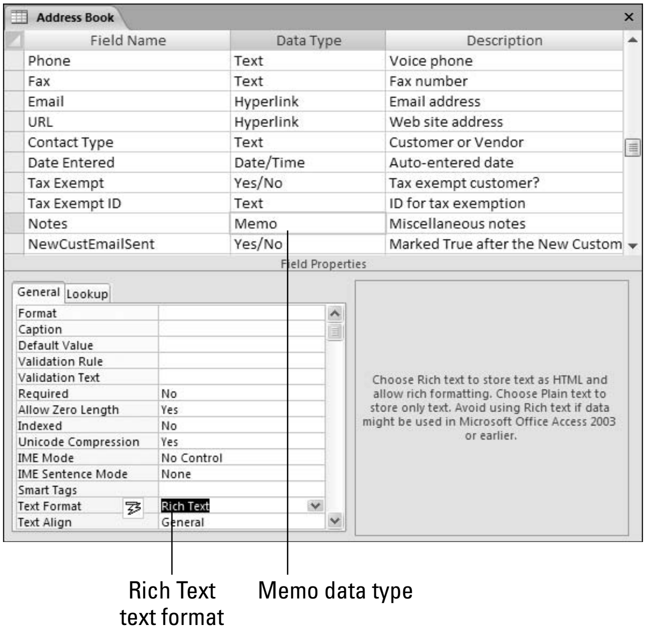
Change the font by using the Font tools on the Home tab on the Ribbon.

Select to change the font, font style, and font size. You can underline text by using the Underline check box in the Effects box. The Color option changes the color of the data in the datasheet.

Taking advantage of rich text

Access 2007 supports rich text. This means that you can store formatted text — words in a particular font, size, color, bold, underline, alignment, indents, numbering, bullets, and whether the field fills from left to right or from right to left. In other words, in the right kind of field you can have just about all the text-formatting capabilities you need to make pretty text. However, to take advantage of rich text, the field must be a Memo field. Otherwise, you will end up formatting the whole datasheet, rather than just part of one field.

To create a field to hold rich text, create a Memo field, and set its `Text Format` property to `Rich Text`. (See Figure 2-9.) For more information on working in Design view to change the data type and field properties for a field, see Chapter 1 of this minibook.



Field Name	Data Type	Description
Phone	Text	Voice phone
Fax	Text	Fax number
Email	Hyperlink	Email address
URL	Hyperlink	Web site address
Contact Type	Text	Customer or Vendor
Date Entered	Date/Time	Auto-entered date
Tax Exempt	Yes/No	Tax exempt customer?
Tax Exempt ID	Text	ID for tax exemption
Notes	Memo	Miscellaneous notes
NewCustEmailSent	Yes/No	Marked True after the New Custom

Format	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	Yes
Indexed	No
Unicode Compression	Yes
IME Mode	No Control
IME Sentence Mode	None
Smart Tags	
Text Format	Rich Text
Text Align	General

Choose Rich text to store text as HTML and allow rich formatting. Choose Plain text to store only text. Avoid using Rich text if data might be used in Microsoft Office Access 2003 or earlier.

Figure 2-9: To create a rich-text field, set the data type to Memo, and the `Text Format` field property to `Rich Text`.

Once you have created a rich-text field, view your data in a datasheet or, even better, in a form, and format away. The formatting options on the Home tab on the Ribbon will all be available to you. To format text, first use the mouse to select the text you want to format, and then select the type of formatting you want to apply.

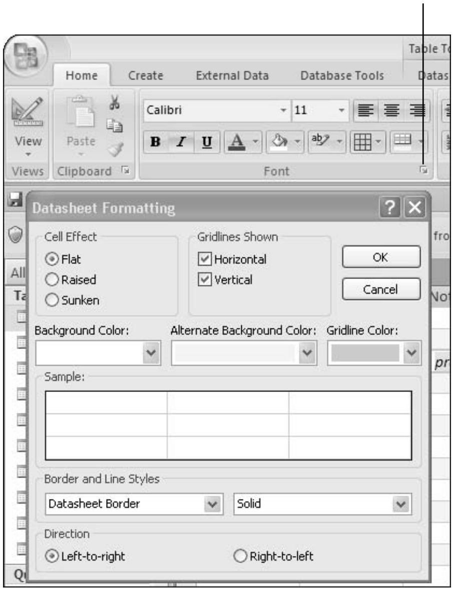
TIP

Rich text can be displayed in a form or report in a Text Box control. The text box has a `Text Format` property that must be set to `Rich Text` for the text to appear on-screen with its formatting.

Changing gridlines and background color

Gridlines are the gray horizontal and vertical lines that separate cells in a datasheet. You can change the color of the gridlines or choose not to display the gridlines at all. You can even choose a special gridline effect other than plain lines.

Access 2007 has a secret button used to display the Datasheet Formatting dialog box (shown in Figure 2-10) — it's at the bottom-right corner of the Font group of the Home tab on the Ribbon. Make any changes (changes reflect in the Sample box), and click OK. You have the option of making the datasheet work from right to left instead of the usual left-to-right — not an option often used, but if you need it, you can find it here.


Secret button

Datasheet Formatting

Cell Effect
● Flat
○ Raised
○ Sunken

Gridlines Shown
☑ Horizontal
☑ Vertical

OK
Cancel

Background Color:
Alternate Background Color:
Gridline Color:

Sample:

Border and Line Styles
Datasheet Border
Solid

Direction
● Left-to-right
○ Right-to-left

Figure 2-10: Use the secret button to display the Datasheet Formatting dialog box.

Rearranging columns in a datasheet

You can rearrange the order of fields in the datasheet in either Datasheet or Design view. Follow these steps, in Datasheet view, to move columns:

1. **Select the column you want to move by clicking the field name.**

   You may want to select a block of columns by then Shift+clicking the last field name in the block.

2. **Drag the column(s) to its new position.**

   As you move the mouse, a dark vertical line shows where the columns move to when you release the mouse button.

If you can't move a column, it's probably frozen. Right-click a field name and choose Unfreeze All Columns to unfreeze it. For more on freezing columns, see the aptly named section "Freezing columns," later in this chapter.

Changing column width

When you initially create a datasheet, all the columns have the same width. But columns are easy to change, and when you save the table, the new column widths are saved too.

To change the width of a column, move the pointer to the bar separating the field names at the top of the column. The mouse pointer changes into a double-headed arrow (shown in the margin). Drag the bar to the appropriate width, or you can double-click to size the column for the widest data in the column.

You can change the width of several adjacent columns at the same time by selecting them (click the field name of the first column, and then Shift+click the field name of the last column), and then changing the width of one column. All the selected columns have the same (new) width.

If you prefer, use the Column Width dialog box to change column width — right-click a field name and choose the Column Width option from the shortcut menu. Enter the width in number of characters. You can use the Standard Width check box to reset the column width to the standard, or the Best Fit button to fit the column width to its contents. Click OK to close the dialog box.

Changing row height

You change the row height in one of two ways — with the mouse or with the Row Height dialog box. You only have to change the height of one row — all the rest change to match. All the rows change to the same height; you can't just change one.

Changing row height with the mouse is very similar to changing column width: Move the mouse pointer to the record selectors until the pointer turns into a double-headed arrow (shown in the margin). Then drag up (to make the row shorter) or down (to make the row taller).

Alternatively, right-click a record selector and select the Row Height option from the shortcut menu to display the Row Height dialog box. Enter the row height in points (there are 72 points in an inch). The Standard Height check box formats the row height at the standard height for the font size that you have chosen (the point size of the font, plus a cushion for the top and the bottom of the row).

Inserting and deleting columns

Remember, columns are fields, so when you insert a column you are adding a new field, and when you delete a column you delete the field and all its data. You can add and remove fields in Design view — that's covered in Chapter 1 of this minibook.

To insert a field in Datasheet view, follow these steps:

1. **Right-click the field name of the column where you want the new, blank column.**
2. **Choose the Insert Column option from the shortcut menu.**

   A column with the name Field 1 (or some other number) is added. The selected columns and all the columns to the right move to make room.
3. **Rename the field name by right-clicking it and choosing the Rename Column option from the shortcut menu.**
4. **Type the new name and press Enter.**

   The new field also appears in Design view.

To delete a field and all its data, right-click the field name and choose the Delete Column option from the shortcut menu. Click the Yes button to permanently delete the field and its data. Buttons to insert, delete, and rename a field are also available in the Fields and Columns group of the Datasheet tab on the Ribbon.

Hiding columns

If you want to hide a column in a datasheet (perhaps the data is sensitive), select the column or columns, right-click the selected field name(s), and choose Hide Columns. To display hidden columns, right-click any field name and choose Unhide Columns. A dialog box appears, where you can choose which columns to redisplay.

Freezing columns

When you're working with a wide datasheet, you may want to freeze one or more columns so they don't scroll off the left side of your screen. To freeze one column, first select it, and then right-click the field name and choose Freeze Columns from the shortcut menu. The selected column pops to the left of the datasheet, and stays there. To freeze more than one column, select them, right-click a field name and then Freeze Columns. To unfreeze columns, right-click the field name and choose the Unfreeze All Columns option from the shortcut menu.

Changing default formatting for new tables

Access allows you to change default formatting for tables using the Datasheet tab of the Access Options window. Any changes you make only affect new datasheets, and not tables and queries already created.

Display the Options dialog box by clicking the Office Button (the circle in the top-left corner of the Access window) to display the File menu. Click the Access Options button on the bottom bar of the File menu to display the Access Options window. Click Datasheet in the navigation portion of the Access Options window to display default formatting options for datasheets in the current database.

Use the options to change colors, font, gridline, and cell-effect options.

Most of the options in this dialog box (default colors, default font, gridlines, and cell effects) have already been discussed in this chapter.

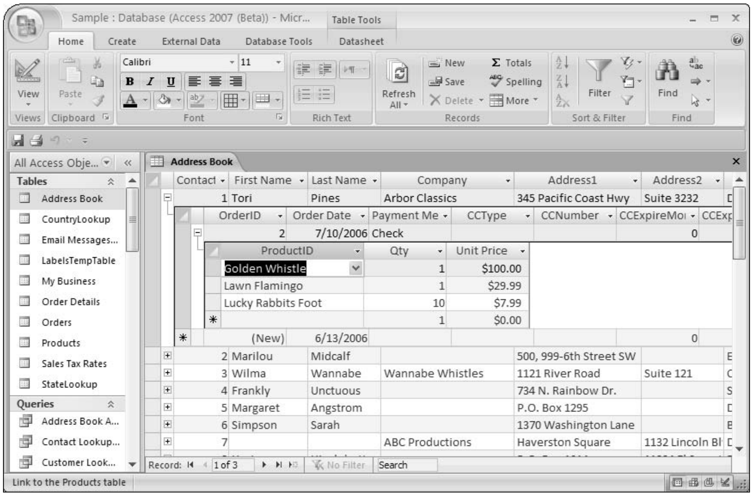
Taking Advantage of Subdatasheets

Access has a nifty feature that allows you to display data from related tables in your datasheet. This feature makes related data easy to view and enter — without using a form.

Access automatically creates subdatasheets in a datasheet if you create a one-to-one relationship with another table, or if the datasheet is on the one side of a one-to-many relationship with another table. (You need to define a relationship in the Relationship window, or use the Lookup Wizard that creates a relationship as the wizard creates a drop-down list.) Queries may have subdatasheets also. (See Book I, Chapter 4 and Chapter 6 of this minibook for more information on relationships.)

When a subdatasheet is available, you see a + (plus) sign in the first column of the table. Click the + sign to see the subdatasheet. When the subdatasheet displays, the + sign changes to a – (minus) sign. Click the – sign to remove the subdatasheet. By default, subdatasheets display for one record in the parent table. To display all data from the related table, click the More button in the Records group of the Home tab on the Ribbon, choose Subdatasheets➪Expand All. To hide all subdatasheets, click the More button and choose Subdatasheets➪Collapse All.

Figure 2-11 shows a datasheet with two levels of subdatasheets. The main datasheet shows names and addresses of customers. The first-level subdatasheet lists order information; the second-level subdatasheet lists order details (items ordered).



Contact	First Name	Last Name	Company	Address1	Address2	
1	Tori	Pines	Arbor Classics	345 Pacific Coast Hwy	Suite 3232	D

OrderID	Order Date	Payment Me	CCType	CCNumber	CCExpireMo	CCExp
2	7/10/2006	Check			0	

ProductID	Qty	Unit Price
Golden Whistle	1	$100.00
Lawn Flamingo	1	$29.99
Lucky Rabbits Foot	10	$7.99
*	1	$0.00

OrderID	Order Date	Payment Me	CCType	CCNumber	CCExpireMo	CCExp
(New)	6/13/2006				0	

Contact	First Name	Last Name	Company	Address1	Address2	
2	Marilou	Midcalf		500, 999-6th Street SW		E
3	Wilma	Wannabe	Wannabe Whistles	1121 River Road	Suite 121	C
4	Frankly	Unctuous		734 N. Rainbow Dr.		S
5	Margaret	Angstrom		P.O. Box 1295		D
6	Simpson	Sarah		1370 Washington Lane		B
7			ABC Productions	Haverston Square	1132 Lincoln Bl	D

Figure 2-11: This table displays two levels of subdatasheets.

When a subdatasheet is displayed, you can use it as you would use a table — to view, format, enter, edit, or delete data.

Access determines which table to display as a subdatasheet based on the relationships you define in the database. However, you can select a table or query to be used as a subdatasheet on the Table Property Sheet. (Display the table in Design view and click the Property Sheet button on the Design tab.)

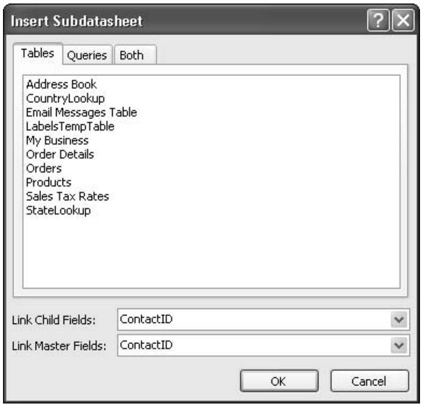
TIP

You can use a query as a subdatasheet — doing so allows you to filter the data displayed in the subdatasheet using criteria defined in the query.

When you select a subdatasheet manually, you need to know the name of the table or query you use as the subdatasheet, as well as the names of the two related fields — one in the parent table and the other in the subdatasheet table. The two fields need to meet the requirements of related fields (see Chapter 6 of this minibook). Follow these steps to select a table or query to be used as a subdatasheet:

1. **Click the More button in the Records group of the Home tab on the Ribbon.**
2. **Choose Subdatasheets⇨Subdatasheets from the menu.**

   The Insert Subdatasheet dialog box (shown in Figure 2-12) appears.



Address Book
CountryLookup
Email Messages Table
LabelsTempTable
My Business
Order Details
Orders
Products
Sales Tax Rates
StateLookup

Link Child Fields: ContactID

Link Master Fields: ContactID

Figure 2-12: Use the Insert Subdatasheet dialog box when you want to specify the subdatasheet.

3. **Select the table or query you want to use as a subdatasheet.**

   To view just your tables, click the Tables tab; to view just your queries, click the Queries tab; to view both tables and queries, click the Both tab.
4. **Use the Link Child Fields drop-down menu to select the field from the subdatasheet table that you want to use to link the two tables.**
5. **Use the Link Master Fields drop-down menu to choose the field from the parent table that you want to use to link the two tables.**
6. **Click OK.**

Adding a Totals Row to the Datasheet

Access 2007 has a handy new feature that allows you to add a totals row to a datasheet. A *totals row* can be used to count the number of items in a column, calculate a sum, average, or find the minimum or maximum value. These are all examples of aggregate functions — you can use them in queries, but now you can also use them in a totals row of a datasheet.

Follow these steps to create a totals row:

1. **Display the datasheet and click the Totals button in the Records group of the Home tab on the Ribbon.**

   Access creates a row titled Total at the bottom of the datasheet.

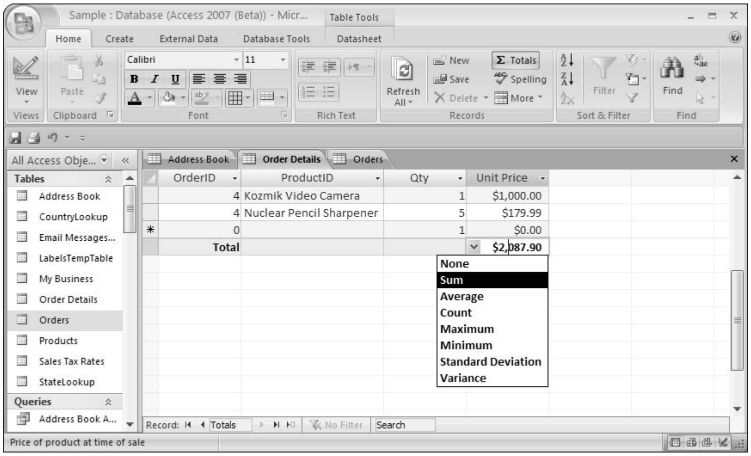
2. **Click one of the blank cells in the Total row to display an arrow; click the arrow to display a drop-down list of aggregation options.**

3. **Choose the kind of total you want to display.**

   The choices are None, Sum, Average, Count, Maximum, Minimum, Standard Deviation, or Variance. For Text and Memo fields, you can choose Count to count the number of entries in the field. For Date fields the choices are limited to Average, Count, Maximum, and Minimum.

   Access displays the aggregate as shown in Figure 2-13. To change the kind of aggregation, simply select the cell and choose another option from the drop-down list.

To clear the Totals row, simply click the Totals button again. If you change your mind and want your aggregates back, Access will remember the type of aggregation you chose. You may also want to add a Totals row to queries displayed in Datasheet view. See the next book for more on queries.



	OrderID	ProductID	Qty	Unit Price
	4	Kozmik Video Camera	1	$1,000.00
	4	Nuclear Pencil Sharpener	5	$179.99
*	0		1	$0.00
	Total			$2,087.90

None
Sum
Average
Count
Maximum
Minimum
Standard Deviation
Variance

Figure 2-13: Click the Totals button on the Home tab of the Ribbon, then choose the type of aggregation you want for the field.

The totals will adjust when a filter is applied to the datasheet. See the next chapter for more on filters. Totals rows do not appear in subdatasheets.

Chapter 3: Sorting, Finding, and Filtering Data

In This Chapter

- **Sorting data in a datasheet**
- **Finding a specific record**
- **Using filters to find a subset of a datasheet**

A datasheet is a good place to start analyzing your data, especially if you only need to look at the data in one table. Within a datasheet, you can sort (alphabetize) — using any field and filter — to find records that are alike or that meet simple criteria. And if you're looking at a datasheet generated by a query, these datasheet tools may be just what you need to find the data you want without redefining the query.

Sorting the Rows of a Datasheet

You may enter data randomly, but it doesn't have to stay that way. Use the Sort buttons to sort the records (rows) into an order that makes sense.

Before you sort, decide which field you want to sort, and then place your cursor somewhere in that field. Then use one of the two Sort buttons on the Home tab of the Ribbon to sort the datasheet. Another way to sort the field is to click the down arrow next to the field name — the first two choices on the drop-down menu are Sort Smallest to Largest and Sort Largest to Smallest.

Sort Button	*Sort Order*
AZ↓	Sorts from smaller to larger and A to Z
ZA↓	Sorts from larger to smaller and Z to A
AZ✕	Clear All Sorts button returns records to their previous order

REMEMBER

When you add a new record to a sorted datasheet, the datasheet does not automatically resort itself — you have to use the sort button again to sort the new records in with the already existing records.

If you want to return records to their unsorted order, click the Clear All Sorts button on the Home tab on the Ribbon. However, if you have an order that you want to be able to return to (for instance, the order in which the records were entered), it's a good idea to have a field that you can sort on when you want to re-create that order.

TIP

An AutoNumber field often serves that purpose, but if that won't work for the order you want, consider adding a field that you can sort on to get your data in order. Don't let the order of records be a hidden clue to your data — include that information explicitly in a field.

Sort-order oddities

When sorting a Number or Currency field, values sort from smallest to largest (at least, they do when you are sorting in ascending order). But when you sort a Text field, values are sorted alphabetically, starting at the left end of the field. This difference between the two fields means that in a Text field, Access sorts 55 before 6, because the 5 character comes before the 6 character. For example, Access sorts the same list of numbers in Number and Text fields like this:

Number Sort	Text Sort
1	1
2	11
5	2
11	21
21	44
44	5

If you need to sort the numbers in a text field into numerical order, Access online help has an excellent help page on the topic. You'll have to create a new field, using an expression to convert the text into a numerical value — and then you can sort using that new field. The help page is called "Sort records on numeric values stored in a text field." You can find it in the Filtering and Sorting section of the help system.

Sometimes you need to know exactly how Access sorts blanks and special characters. The sort order, in ascending order, looks like this:

- blanks (null)
- space
- special characters such as `!`, `"`, `#`, `%`, `&`, `(`, comma, period, `[`, `^`, `` ` ``, `~` (in that order, incidentally)
- letters (Access does not distinguish between uppercase and lowercase letters when sorting)
- numbers

If you need to know how Access sorts some characters that aren't listed here, make a test table with the characters you need to sort, and sort them!

When you sort a Number field in ascending order, Access lists records from the smallest number to the largest. When you sort a Text field in ascending order, records are alphabetized from A to Z. When you sort a Date field in ascending order, records are listed from oldest date to most recent date. Descending order is the opposite in all three cases: largest-to-smallest number, Z to A, or most recent to oldest date.

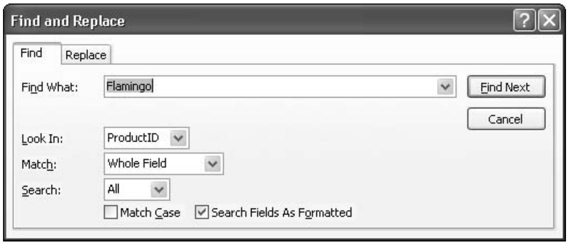
Finding (and Replacing) Data

Do you like the quick-and-dirty approach, or are you more thoughtful and refined? Access accommodates both personalities. To search quickly for data in a datasheet, use the Search box at the bottom of the datasheet; it's located to the right of the VCR buttons and to the left of the scroll bar. Type your search text into the box and with no further ado, Access takes you to the first instance of the text. You don't even have to press Enter. In fact, as you type, Access is moving the focus in the datasheet to the first instance of the text you're typing. To find the next instance, press Enter. Continue at will!

If you want to be more specific about what you're looking for, you may prefer the Find and Replace dialog box. Access even takes the text you typed in the Search box and puts it into the Find and Replace box automatically, so you have it as a starting point.

If you want to look within a single field, put the cursor anywhere in that field's column before you begin the search.

Display the Find and Replace dialog box (shown in Figure 3-1) by pressing Ctrl+F or by clicking the Find button in the Find group of the Home tab on the Ribbon.



Find What: Flamingo

Look In: ProductID

Match: Whole Field

Search: All

□ Match Case ☑ Search Fields As Formatted

Figure 3-1: Press Ctrl+F to see the Find and Replace dialog box.

Using the Find and Replace dialog box for quick-and-dirty searches is as easy as 1-2-3:

1. **Press Ctrl+F to display the Find and Replace dialog box.**
2. **Type what you're looking for in the Find What box.**
3. **Press Enter or click the Find Next button.**

   Access highlights the first instance of the Find What text.

Quick-and-dirty may work just fine for you, but you need to know about a few refinements to the Find and Replace dialog box — such as telling Access to limit its search to particular places. The default settings on the Find and Replace dialog box tell Access to search the field the cursor is in, and to match your search term word for word. You may find, however, that other options in the dialog box make it easier to find exactly what you're looking for. Keep reading to find out more!

The Find and Replace dialog box and its options

If you don't know how to use the options in the Find and Replace dialog box, it won't help you much with finding what you're looking for. So a guided tour is in order.

The Find and Replace dialog box has the following options:

- **Find What:** Here's where you type in the text or value that you're looking for.
- **Look In:** Here's where you tell Access where to look — the field the cursor is in, a series of fields, or the whole table. If you select a bunch of fields or records before displaying the Find and Replace dialog box, Access searches the selected cells — and you can't change the Look In option. (Select contiguous fields by clicking the first field name and then Shift+clicking the last field name.) If you don't select a particular field, you can choose either the field where the cursor is, or the whole table (the table name will be listed).
- **Match:** Choose how the search results match the Find What text. You can choose from the following options: Any Part of Field, Whole Field, or Start of Field. The Any Part of Field option finds the most instances. If you search for `Flamingo` using the Any Part of Field option, Access finds `Lawn Flamingo`. The Whole Field option only finds cells that match the whole word, `Flamingo` — it does not find `Lawn Flamingo`. The Start of Field option finds cells that begin with `Flamingo`, such as `Flamingos`.
- **Find Next:** Finds the next instance of the Find What text.
- **Search:** Choose the direction (from the cursor) to search: Up, Down, or All.

- **Match Case:** Match the case of the text — if you want to find `THIS` but not `This`, use the Match Case option.
- **Search Fields as Formatted:** Finds data according to how it looks, rather than how it was entered. If you use an input mask on a telephone-number field (for example), you may input ten digits one after another, but they appear with parentheses around the area code and a hyphen after the exchange. If you use the Search Fields as Formatted option, you can search for `(508)` to find phone numbers in the 508 area code.

TIP

The broadest search uses the following options: Look In *Tablename* (the whole table), Match Any Part of Field, Search All, and deselect Match Case. Other choices in the Look In, Match, and Search options narrow the search — and may miss particular instances of the Find What text. That's not necessarily a bad thing, by the way — especially if you have a very clear idea of where you want to find what you're looking for.

Replacing the data you find

To replace data with new data, first define what you're looking for using the Find tab, as described in the previous section, and then use the Replace With option on the Replace tab to define how you want to replace it.

You can replace instances one at a time by using the Replace (to replace) and Find Next (to skip that instance) buttons. Or you can replace all instances using the Replace All button.

WARNING!

The Undo button can only undo the last replacement made — it won't undo a whole slew of them, so use the Replace All button carefully.

CROSS-REFERENCE

If the Find and Replace dialog box isn't quite what you need, you may want to filter your datasheet and then make replacements, or you may want to try out action queries. For more on filters, see the next section; for more on action queries, check out Book III.

Filtering a Datasheet

Filtering a datasheet is a way to focus on specific records, rather than all the records in a table. You can filter out records that aren't relevant to what you're trying to do at the moment.

When you filter data, you use criteria to tell Access what you want to see. A *criterion* is a test that the data passes in order to display after the filter applies. For example, you may ask Access to show you the records with an order date of 5/1/06. A more advanced criterion is orders with a date *on or after* 5/1/06. Access will then show you only the data that meets your criteria. All other records are hidden until you remove the filter.

Table 3-1 tells you how to use each of the filter options. Access 2007 has new filtering abilities, enabling you to easily apply common filters, for instance, to filter data from a particular month. These common filters are built into every view that displays data. Here we discuss how to use them in Datasheet view.

Table 3-1 Types of Datasheet Filters

Type of Filter	*When You Should Use It*
Common Filters	When you want to find dates from a certain month, or text with certain similar characteristics, or use a logical operator to filter a number field.
Filter by Selection	You have a record with a certain value in a field, and you want to find all the other records that have the same value in that particular field.
Filter by Form	You have more than one criterion; for instance, you want to find orders placed before 6/1/06 paid for by credit card.
Advanced Filter/Sort	You want to do more than the other filters allow, such as sorting and applying criteria to multiple fields. Advanced Filter/Sort creates a query using only one table.

There are some cases when a filter is not the best tool for the job. If you are looking for the top or bottom values in a field, or unique or duplicate values, then you need to use a query.

Filtering basics

If you want to get a handle on the whole filtering concept, start out by taking a look at the parts of a datasheet that relate to filters. To start with, you can display the filter menu for any field by clicking the arrow next to the field name. To see what common filters are provided, choose the item above all the check boxes — in Figure 3-2, it reads `Number Filters`. To filter to a particular selection, use the check boxes (more about that in a sec).

Figure 3-2 shows a datasheet with the filter buttons and indicators marked. This datasheet has a filter applied — you can tell because of the Filtered datasheet indicators at the bottom of the datasheet. Also, the Toggle Filter button is highlighted — if it's clicked again, the filter is removed and all the records in the datasheet display. If you hover the mouse pointer over the field name of the filtered field, a screen tip appears, showing the current filter definition.

You can apply a filter to any datasheet — that includes a table, of course, but also subdatasheets and datasheets generated by queries. (When you apply a filter to a subdatasheet, all the data displayed from the subdatasheet table is filtered, not just the section where you apply the filter.)You can enter and edit data in a filtered datasheet as usual. Just be aware that the filter has no effect on any new records until you re-apply the filter.

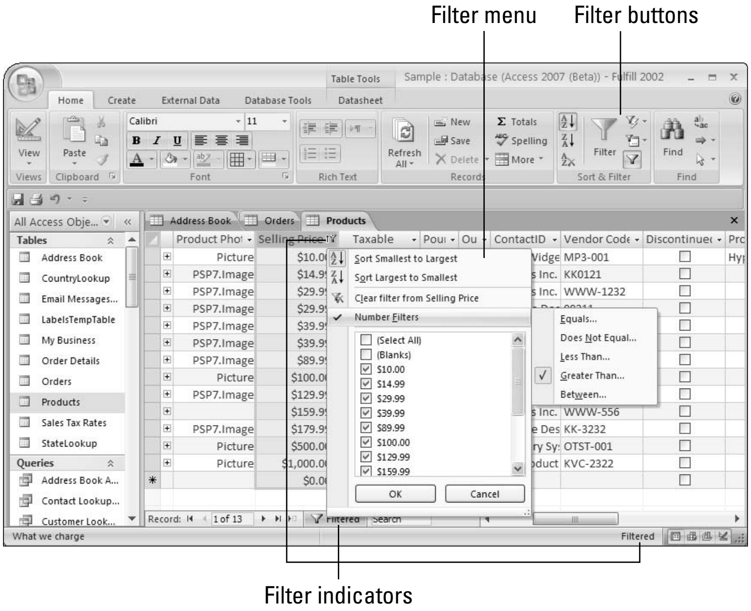


Figure 3-2: A filtered datasheet.

To remove a filter, click the Toggle Filter button in the Sort & Filter group of the Home tab on the Ribbon. To re-apply the last filter you applied, click Toggle Filter again. The Filtered/Unfiltered indicator next to the VCR buttons at the bottom of the datasheet works the same way as the Toggle Filter button. To clear the filter so that it is not applied when you click Toggle Filter, choose Advanced⇨Clear All Filters from the Sort and Filter group of the Home tab on the Ribbon.

If you apply a filter to one field, and then apply a filter to another field, Access will use both filters to choose the records to display. However, only one filter at a time can be used on each field @md the second filter will override the first — so it's a good idea to know how to remove (that is, clear) your filters:

- Clear the filters from a single field by clicking the arrow next to the field name and choosing Clear Filter from *field name*.
- Clear all filters from the table by clicking Advanced and choosing Clear All Filters.

TIP

A filter runs a simple query on one table — a good way to start analyzing your data. Filtering can help you warm up to creating more complex queries. If you're confused about queries, creating a filter can help you figure out how to write criteria for a query (and so can Book III!). When you create the filter, click Advanced and choose Advanced Filter/Sort to see it in the design grid. Look at the Criteria row to see what the criteria look like. To close the design grid, click the Close button.

If you want to use the filter to create forms and reports, save it while in the Advanced Filter/Sort window by clicking Advanced and choosing Save as Query.

Filters appear in the `Filter` property of the Properties sheet. You can filter a table by entering an expression there — but almost no one does that because the filter stays applied, and some records may be filtered out the moment you open the table.

The next sections detail how to use each type of filter.

Filtering by selection

Filtering by selection is the simplest kind of filter — it finds records with matching values in one field. To filter by selection, follow these steps:

1. **Find a record with the value or text you want to match and then place your cursor in that cell to match the whole value.**
   - To find all products with the price of $29.99, place the cursor in a `Price` cell with the value `29.99`.
   - To match the beginning of the value, select the first character and as many thereafter as you want to match. To find all entries in the field that start with `La`, for example, highlight the `La` in `Lawn Flamingo` before filtering.
   - To match part of the value, select the characters in the middle of a value that you want to match. Select `99` to find all values that contain `99`, such as `499`.

2. **Click the Selection button in the Sort & Filter group of the Home tab on the Ribbon.**
3. **Select the first choice, Equals *X*.**

   Access filters the datasheet to display only records that have the same value in that field.

To see the entire table, click the Toggle Filter button (which toggles the filter off and on).

By selecting a value in a datasheet you can easily filter to find values equal to the value you're looking for (as you just did), or go after those *un*equal to that value (a process known as *filtering by exclusion*). Depending on the data type, other options are also available:

✦ **Number fields and Date/Time fields:** Filter to values greater than or less than the selected value. The Selection button also offers a Between option so you can specify an upper and lower limit for the values you want to see in the filtered datasheet.

- **Text:** Filter to records that either contain the selected text or do not contain the selected text. These two options are useful if you have selected a portion of a text field.

Common filters

New in Access 2007, common filters are built into Access. The filters available depend on the data type of the field that you are filtering. The most interesting choices are for Date/Time fields.

Follow these steps to use common filters to filter a field:

1. **To see the filters available, click the arrow next to the field name, or click the Filter button when the cursor is in the field.**

   At this point you may want to filter to a specific value. To first deselect all values, click the first check box, Select All. This check box toggles between two options: selecting all check boxes and deselecting all check boxes. You can then select the values you want to see when the datasheet is filtered. Click OK to see the filtered datasheet.

2. **To choose from more filtering options, highlight the menu option immediately above the check boxes.**

   The name of this menu option changes with each data type. It is called Date Filters for Date/Time fields, Text Filters, Number Filters, and so on.

3. **For Date/Time fields, highlight All Dates In Period to display another level of choices.**

   From this submenu, you can choose to see data in one quarter or one month of the year. Figure 3-3 shows all the filtering options available for a Date/Time field.

Filtering using criteria on multiple fields

When you have criteria for multiple fields, you can simply apply the filters to the various fields using the techniques you've already learned in this chapter, and Access will display only the records that meet all the criteria. Another choice, which is more flexible, is to use the Filter by Form feature to find the records you need.

To Filter by Form, click the Advanced button in the Sort & Filter group of the Home tab on the Ribbon, and then choose Filter by Form. Access displays a form that looks like a single row of the table you're filtering. Use the form, as shown in Figure 3-4, to specify the criteria you want to use to filter your data.

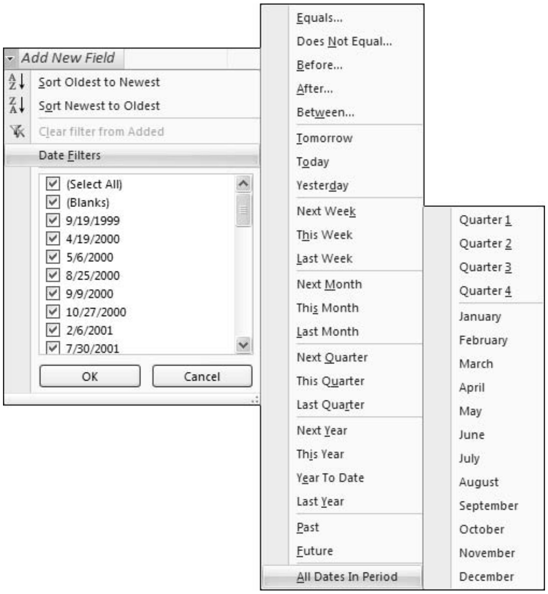
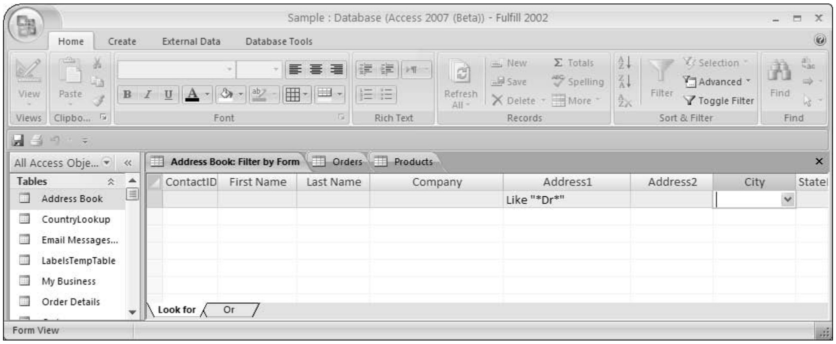


Figure 3-3: Date/Time fields have many, many filtering options.



ContactID	First Name	Last Name	Company	Address1	Address2	City	State
				Like "*Dr*"			

Figure 3-4: The Filter by Form window.

When you filter by form, you not only get to use multiple criteria, you also get to choose how the data filters through whatever multiple criteria you set up. Do you want a record to meet *all* the criteria before it shows up on-screen? Or is just meeting one criterion enough to display the record on the filtered datasheet? The following two operators are what you use to tell your criteria how they should act together:

- `And`: The criteria act together hand in glove — a record has to pass all criteria in order to display on the filtered datasheet.
- `Or`: A record has to pass only one criterion in order for it to display on the filtered datasheet.

You may use more than two criteria using both the `Or` and `And` operators. The way you put criteria in the form defines how multiple criteria act together. Use the Look for and Or tabs at the bottom of the form:

- Criteria on a single tab act as if they are joined by the `And` operator.
- Criteria on separate tabs act as if they are joined by the `Or` operator.

To take advantage of all this versatility, follow these steps to filter a datasheet by form:

1. **Click the Advanced button in the Sort & Filter group of the Home tab on the Ribbon, and choose Filter by Form.**

   Access displays the Filter by Form window, which looks like an empty datasheet.

2. **Move the cursor to a field you have a criterion for.**

   For instance, if you only want to see addresses from Pennsylvania, move the cursor to the `State` field. A drop-down list arrow appears in the field.

3. **Click the arrow to see the list of entries in the field.**

   You may want to type the first letter or digit of your criteria to move to that point in the drop-down list.

4. **Select the value in the drop-down list that you want the filtered records to match.**

   Access displays the text that the filter is looking for inside quotation marks.

   If you aren't looking to match the entire field but are looking for a match in part of the field, type **LIKE "*value that you're looking for*"** (remember to include the quotation marks). For example, type **LIKE "new"** in the `City` field to find all records with `new` in the city name. You can use more complex criteria too — for more information, see Book III, Chapter 3.

5. **If you have a criterion for another field that needs to be applied at the same time as the criterion you set in Step 4, repeat Steps 2 through 4 for the additional field.**

   Setting up criteria to work together illustrates the usefulness of the `And` operator. If you want to find addresses in San Francisco, CA, set the `State` field to `CA` and the `City` field to `San Francisco`.

6. **If you have a completely different set of rules to filter records by, click the Or tab at the bottom left of the Filter by Form window.**

   Access displays a blank Filter by Form tab. When you set criteria on more than one tab, a record only has to meet all the criteria on any one tab to appear on the filtered datasheet.

7. **Choose the criteria on the second tab in the same way you choose those on the first — click the field and choose the value that you want to match.**

   If, in addition to all the addresses in San Francisco, you want to see all the addresses from Boston, MA, set the `State` field on the Or tab to `MA` and the `City` field to `Boston`.

   When you use an Or tab, another Or tab appears, allowing you to continue adding as many sets of `Or` criteria as you need.

8. **Click the Toggle Filter button on the Ribbon to see the filtered table.**

Filtering Using Advanced Filter/Sort

The Advanced Filter/Sort feature in Access is really a query — the simplest kind of query. It allows you to find and sort information from one table in the database. This option is available from a datasheet by clicking Advanced and choosing Advanced Filter/Sort.

Use Advanced Filter/Sort when you want to use the more familiar Query by Example (QBE) grid to sort and filter a table. (In fact, you can load filter criteria from an existing query by clicking Advanced➪Load from Query in the Sort and Filter group of the Datasheet tab on the Ribbon.)

Figure 3-5 shows the Advanced Filter/Sort window.

TIP

This section gives you the basics of performing an advanced filter-and-sort operation, but because the features of the Advanced Filter/Sort window are nearly identical to the features of queries, you may want to read Book III, Chapter 1 for more details.

Follow these steps to sort and filter a table using the Advanced Filter/Sort feature:

1. **Open the table you want to filter in Datasheet view.**
2. **Click the Advanced button in the Sort & Filter group of the Home tab on the Ribbon and choose Advanced Filter/Sort.**

   Access displays the Filter window, which has two parts, just like Design view for queries. Notice that there is now a tab for the table and a tab for the filter that you are defining.

3. **In the top half of the window you see a box with the table name and all the fields in the table listed. Double-click the first field you want to use to filter the table.**

   The field appears in the Field row of the first column of the QBE grid in the bottom half of the window.

TIP

Instead of double-clicking a field, you can choose a field from the Field drop-down list in the QBE grid. Click in the Field row of the grid to see the arrow for the drop-down list.

4. **Click the Criteria row in the first column and type the criteria to limit the records you see.**

   If you want to see only items that cost more than $10, select the `Selling Price` field as the field you want to use as your filter, and then type >**10** in the Criteria row of the same column of the QBE grid.

5. **Repeat Steps 3 and 4 to add other fields and criteria to the grid.**

6. **(Optional) Choose a field by which to sort the resulting table and then choose Ascending or Descending order.**

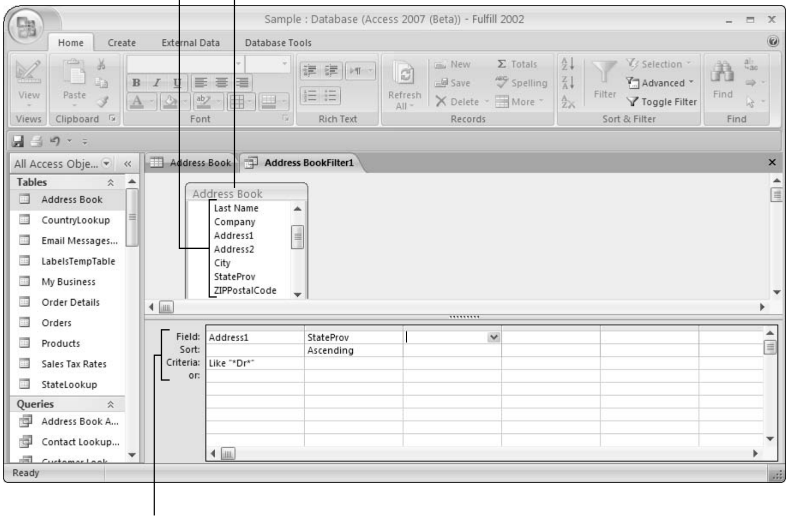
   A drop-down list appears for the Sort row in the column, containing the field you want to sort. Access sorts the table that results from the advanced filter in ascending or descending order, using the field listed in the same column as the sort key.

7. **When you finish creating all the criteria you need, click the Toggle Filter button to see the resulting table.**

   Access displays all the fields in the original table, but it filters the records and displays only those that meet the criteria.

Field names

Table name



Field:	Address1	StateProv
Sort:		Ascending
Criteria:	Like "*Dr*"	
or:		

Query by Example (QBE) grid

Figure 3-5: The Advanced Filter/Sort window.

You can do several things with the resulting filtered table:

- **Filter it again:** Use the filter options to filter the table even more.
- **Print it:** Click the Print button.
- **Sort it:** The best way to sort is to use the Sort row in the design grid (click the tab for the Filter window to display the QBE grid again). But you can use the Sort Ascending or Sort Descending buttons to sort the table by the field that the cursor is in.
- **Fix it:** Click the tab for the Filter window to display the Filter window again to fix the criteria or other information in the grid.
- **Add data to it:** Add data to the table by clicking the New Record button and typing in the data.
- **Edit data:** Edit data the same way that you do in the datasheet. When you look at the unfiltered table, you see any changes you made in the filtered table.
- **Delete records:** You can delete entire records if you want — click the record you want to delete and then click the Delete Record button.
- **Toggle between the filtered table and the full table:** Click the Toggle Filter button.
  - If you're looking at the full table, clicking the Toggle Filter button displays the filtered table (according to the last filter that you applied).
  - If you're looking at the filtered table, clicking the Toggle Filter button displays the full table.

If you want to save your advanced filter, you have to save it in Design view. After you apply the filter, return to Design view by clicking the tab for the filter. Right-click the Filter tab and choose Save to save the advanced filter. You can find the filter, after it's saved, listed with the Queries button in the Navigation Pane.

Creating a report or form with a filter

After you get the hang of filtering a datasheet, you may realize that what you really want to do is create a form or report with the same filter you've just applied to your datasheet. You can — and quite easily — by using the buttons on the Create tab of the Ribbon. First filter the datasheet, and then select the type of object you want to create. Access prompts you to save the table. Then you can either display the new object (if you select AutoForm or AutoReport) or display the New Form or New Report dialog box. You can find the filter you created in the `Filter` property of the Properties sheet for the new object. Pretty slick.

Chapter 4: Importing and Exporting Data

In This Chapter

- **Importing data from other programs into Access**
- **Linking data from other programs into Access**
- **Cleaning up your imported data**
- **Exporting data from Access**
- **Collecting data though e-mails**

Even if you love Access, you may not end up using it for every single data-oriented task you need to do. Because of that, you may need to get data from another format (such as an Excel spreadsheet) into Access. Or you may want to take data from an Access database and use it elsewhere — say, a statistical report, spreadsheet, or word-processing document.

But never fear — you can get data from other applications into Access. Or, if you prefer, you can leave your data in other applications and have Access link to it there (although you should have a really good reason to do that, because it can get tricky). Access provides a number of ways to import and export data.

The rest of this chapter covers different methods of getting data into and out of Access, starting with the easiest method — cutting and pasting.

Cutting, Copying, and Pasting

The most basic way to move information is cutting and pasting (or copying and pasting) using the Windows Clipboard or the Office Clipboard. Cutting and pasting is a straightforward (and relatively simple) way to move or copy information into or out of Access, or from one place to another within Access.

You can use the Cut, Copy, and Paste commands in at least two ways: by clicking buttons or by pressing shortcut keys. Table 4-1 lists buttons and keystrokes for cutting, copying, and pasting.

Table 4-1 Cutting, Pasting, and Copying Options

Button	*Keystroke*	*What It Does*
✂	Ctrl+X	Cuts the selection and stores it on the Clipboard.
⎘	Ctrl+C	Copies the selection to the Clipboard.
📋	Ctrl+V	Pastes the contents of the Clipboard.

To copy or cut and paste data, follow these steps:

1. **Select the data or object that you want to cut or copy.**
2. **Choose your favorite method (Ribbon button or hot key) to cut or copy what you selected.**

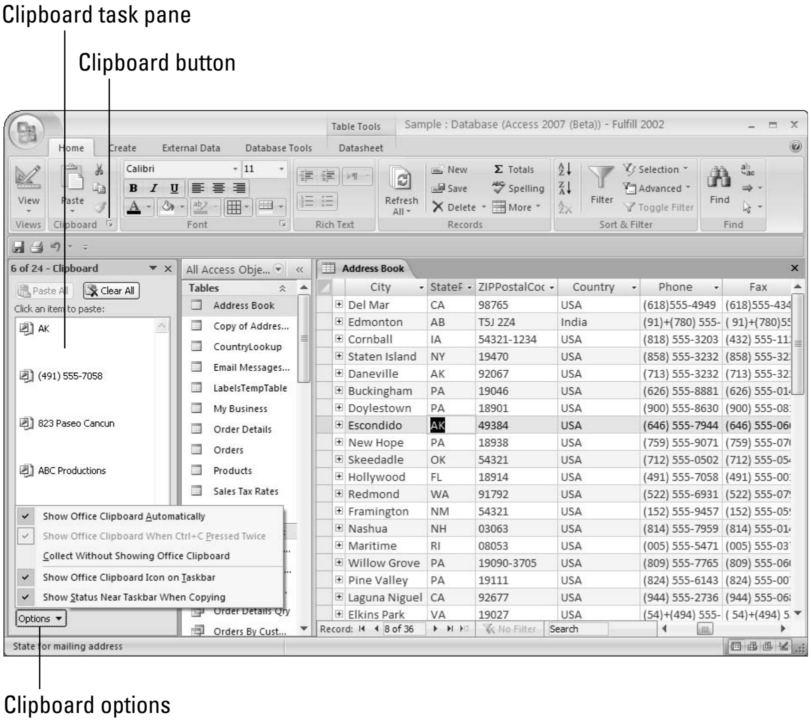
   You can also right-click the selection and choose Cut or Copy.

   When you cut something, it disappears from the screen and is stored on the Windows Clipboard. When you copy something, it stays where it is, and Access also places a copy in the Windows Clipboard.
3. **Move the cursor to the place where you want the item to appear.**
4. **Choose your favorite method (shortcut menu, Ribbon button, hot key) to paste the item.**

The Office Clipboard

Using the Windows Clipboard works the same as using the Office Clipboard, except that the Office Clipboard has more features — mainly, it stores up to 24 clips. The Windows Clipboard stores only one clip. You can use the Office Clipboard when cutting and pasting within Office applications. You can use the Windows Clipboard for copying and pasting in any Windows application that supports its use. When you cut or copy something to the Clipboard, it is saved on both the Windows and Office Clipboards. When you paste from the Clipboard using a keystroke or a button, you get the most recent thing you put on the Clipboard, which is also the top item on the Office Clipboard.

If you always get the most-recently-copied item, what's the point of the Office Clipboard storing up to 24 of your recent clips? The Office Clipboard stores items from all Office applications — Access, Excel, Word, Outlook, and PowerPoint. If you want to see your clips, click the secret Clipboard button on the Home tab of the Ribbon (it's to the right of the word Clipboard, under the Paste button — see Figure 4-1).



Address Book

City	StateF	ZIPPostalCoc	Country	Phone	Fax
Del Mar	CA	98765	USA	(618)555-4949	(618)555-434
Edmonton	AB	T5J 2Z4	India	(91)+(780) 555-	(91)+(780)55
Cornball	IA	54321-1234	USA	(818) 555-3203	(432) 555-11
Staten Island	NY	19470	USA	(858) 555-3232	(858) 555-32
Daneville	AK	92067	USA	(713) 555-3232	(713) 555-32
Buckingham	PA	19046	USA	(626) 555-8881	(626) 555-01
Doylestown	PA	18901	USA	(900) 555-8630	(900) 555-08
Escondido	AK	49384	USA	(646) 555-7944	(646) 555-06
New Hope	PA	18938	USA	(759) 555-9071	(759) 555-07
Skeedadle	OK	54321	USA	(712) 555-0502	(712) 555-05
Hollywood	FL	18914	USA	(491) 555-7058	(491) 555-00
Redmond	WA	91792	USA	(522) 555-6931	(522) 555-07
Framington	NM	54321	USA	(152) 555-9457	(152) 555-05
Nashua	NH	03063	USA	(814) 555-7959	(814) 555-01
Maritime	RI	08053	USA	(005) 555-5471	(005) 555-03
Willow Grove	PA	19090-3705	USA	(809) 555-7765	(809) 555-06
Pine Valley	PA	19111	USA	(824) 555-6143	(824) 555-00
Laguna Niguel	CA	92677	USA	(944) 555-2736	(944) 555-06
Elkins Park	VA	19027	USA	(54)+(494) 555-	(54)+(494) 5

Figure 4-1: The Office Clipboard.

The Clipboard task pane displays the clips that you cut or copy, along with an icon to show you what type of clip it is (from Access, Excel, Word, and so on). Paste any clip — not just the most recent one — at the cursor's position by clicking the clip. Delete a clip from the Clipboard by right-clicking the icon and choosing the Delete option from the shortcut menu. The Paste All button pastes all the stored items at the cursor's position.

Close the Clipboard task pane by clicking the Close button in the pane's upper-right corner.

If you want to keep track of what's in the Clipboard, you can set it to appear automatically whenever you cut or copy more than one item without pasting. Just click the Options button at the bottom of the Clipboard task pane and choose Show Office Clipboard Automatically.

Cutting and pasting small to medium-ish amounts of data

Cutting and pasting is most useful for small pieces of data, but you may also use that capability for a number of fields- or even records-worth of data. If you move lots and lots of data, look at the import and linking options covered later in this chapter — but if you're copying small or medium amounts of data, copying and pasting may work just fine. Access gets picky when you paste more than one piece of data into a datasheet; to help make pasting work most effectively, follow these guidelines:

- Fields (columns) need to be in the same order in the source document as in Access. You may need to rearrange columns in either Access or the source document.
- The data type needs to match the data type of the field you're pasting into. The exceptions are Text and Memo data types, which can accept any type of data.
- You can't paste a duplicate value into the primary key field (just like you can't type a duplicate value into a primary key field).
- You can't paste into a hidden field. Unhide all the fields you're pasting data into before you paste what's in the Clipboard. To unhide, right-click any field name and choose Unhide Columns. However, if you don't have data for one field, and you want to paste into the fields on either side of it, hiding the field before pasting is a good option.
- Data you paste must meet any validation rules and work with any input masks. (See the next chapter for details on those features.)
- You can't copy data into an AutoNumber field. Access generates AutoNumber values for copied records.
- A good option for pasting data is the Paste Append command. To append entire records (with the exception of any AutoNumber fields), paste by using Paste Append — copy the data to the clipboard, display Access, then click the arrow under the Paste button on the Home tab of the Ribbon and select Paste Append.
- If you are adding data into a datasheet that already has data, you may want to paste the new data into a temporary datasheet to make sure the data looks right before you paste it into the permanent datasheet. Another option is to append the table with the new data to the existing table. Append Queries, which do that job, are covered in Book III, Chapter 3.
- If you choose not to use Paste Append or the Append Tables query, you have to select multiple cells (fields, records, or both) if you want to paste content into multiple cells. You don't have to select the exact number of cells that you're copying into — if you don't know the exact number of rows or columns that you want to copy data into, just select more than you think the data will fill. To make new records click the New Record button. You may need to put a piece of data in each record. The dummy data will be overwritten when you copy data into the records.

TIP

- One easy way to select cells in a worksheet is to click the first cell (in the upper-left corner of the range), and then Shift+click the last cell (in the lower-right corner of the range).
- You can't copy into subdatasheets as you copy into the main datasheet. Copy into one table at a time.

Moving data from Excel to Access

Do you have a relatively small amount of data you want to copy and paste from Excel to Access? Follow these steps for a very convenient way to copy and paste into a new Access table:

1. **In Access, open the database to which you want to copy the data.**
2. **In Excel, open the workbook and display the worksheet that contains your data.**

   Make sure that the first row of data makes adequate field names (you can always change them later).
3. **Select the data in Excel and press Ctrl+C to copy the data to the Clipboard.**
4. **Click any table in the Navigation Pane and press Ctrl+V to paste the data into a new table.**
5. **When Access asks if the first row of your data contains column headings, click the Yes button.**

   Access creates a new table from the Excel data with the same name of the Excel worksheet that contained the data. You may need to rename your table, but wasn't that easy?

Alternatively, you open a new or existing table, arrange your windows so you can see both the data in Excel and the table where you want to put the data. Then drag the data from Excel to Access.

If you have large amounts of data, try the Import Spreadsheet Wizard, explained later in this chapter.

Importing or Linking to Data

If you have large quantities of data that you want to use in your Access database, or if you want to take advantage of the features offered by the Link or Import Wizards, you can import or link to the data.

What applications are compatible with Access?

Here's the scenario: You were lucky enough to find the data you need in your database, and it's even in electronic form, but it's in dBASE, Excel, Word, another Access database, or some other file format — what do you do? In most cases, Access knows how to either import the data directly or create a link to the data. Currently, you can import or link to files in the following formats:

- Microsoft Access databases (versions 2.0, 7.0/95, 8.0/97, 9.0/2000, 10.0/Access 2002, 11/Access 2003, 12/Access 2007) and Project (versions 9.0/2000, 10.0/Access 2002, 11.0/Access 2003)
- dBASE versions III, IV, 5, and 7 (linking requires updated ISAM drivers available from Microsoft Technical Support, `www.microsoft.com`)
- Paradox, Paradox for Microsoft Windows 3.*x*, 4.*x*, 5.0, and 8.0 (linking requires updated ISAM drivers available from Microsoft Technical Support, `www.microsoft.com`)
- Microsoft Excel spreadsheets, versions 3.0, 4.0, 5.0, 7.0/95, 8.0/97, 9.0/2000, 10.0/ 2002, and 11/2003
- Lotus 1-2-3 spreadsheets (linking is read-only) in `.wks`, `.wk1`, `.wk3`, and `.wk4` formats
- Microsoft Exchange
- Delimited text files
- Fixed-width text files
- HTML versions 1.0 (if a list), 2.0, 3.*x* (if a table or list)
- XML documents
- SQL tables, Microsoft Visual FoxPro 2.*x,* 3.0, 5.0, and 6.*x* (import only), and data from other programs and databases that support the ODBC protocol (An updated list of supported ODBC drivers is available from the Microsoft Knowledge Base, `www.microsoft.com`.)

TIP

If you have data in a format that your version of Access can't use, you may be able to download updated drivers from the Microsoft Web site at `www.microsoft.com`. Or you can see if the application allows you to export the data to one of the accepted formats. Then you can import it into Access.

To link or to import, that is the question

You have a number of choices about how to make your data available in Access. You must choose whether you want to actually store the data in Access (import the data) or create a link to the data:

- **Import:** Make a copy of the data in Access. (Copying and pasting is the simplest form of importing.)
- **Link:** Keep the data in another file and tell Access to get the data each time it is needed.

Some factors to consider when deciding whether to import or link include the following:

- **Storage:** When you import data, you may be doubling the storage required because you are storing the data in Access as well as in its original format.
- **Customization:** If the data is stored in a format other than Access and you want to define a primary key, enforce referential integrity, change field names, and/or customize field and table properties, you should import the data.
- **Maintenance:** Does the data get updated, and if so, how? If a system is in place to update data in another format, leaving the data where it is and linking to it makes sense, unless you're prepared to create a system to update it in Access. However, if the data is not analyzed in its current format, moving the data to Access and creating a system for updating it there makes sense.
- **Accessibility:** If you're leaning towards linking to the data, will the data always be available when you need it? Is it likely to move, or will you need it when you are traveling or not on your usual LAN? If the data is not accessible, Access will not be able to use that data for queries, reports, and forms.

If you need the data to get started in Access, and will then be using Access exclusively to update and analyze the data, you should import it. If data is collected in another format, and is updated in that format, and you will be using the database from a computer that can always access the data source, then linking is probably a good option. But in this case scheduled imports might work, too. You'll need to evaluate your situation considering the points above to decide whether linking or importing is the better choice.

Getting external data

After you decide whether to import or link to your data, you're ready for the next step. If you can, look at the external data you want to use. Look for the following factors:

- **Are fields stored in columns and records in rows?** This is relevant to text and spreadsheet files.
- **Does the data you need begin at the top of the file?** For text and spreadsheets, Access expects to see one row of names and then the data.

- **Is all data within a field of the same type?** If not, the field imports as a Text or Memo field, which can't be used in mathematical equations.
- **Is the number of fields in each row the same?** This is of particular concern in a text file. If necessary, add null values to make your data line up.
- **Are the field names in the data you are importing identical to the field names in the Access table?** When you append data, the field names you're importing must be identical to the file you're appending to.

Are you importing the data into a new table, or do you want to append the data to an existing table? Appending can be tricky because the data in the external source and in the Access table has to match in data type and in its relative location — you may want to first import into a new table in Access and then use an Append Query. (You find more on appending in general later in this chapter; for more on the Append Query in particular, see Book III, Chapter 3.)

When your data source is ready, you're ready to either import or link. The following are general instructions — followed by some particulars for specific file formats:

1. **In Access, open the database that you want to add external data to.**
2. **Display the External Data tab on the Ribbon and click the button for the kind of data that you're importing.**

   There are buttons for Access, Excel, SharePoint List, Text File and XML file. The More button drop-down list contains buttons for ODBC Database, HTML Document, Outlook Folder, dBASE File, Paradox File, and Lotus 1-2-3 file.

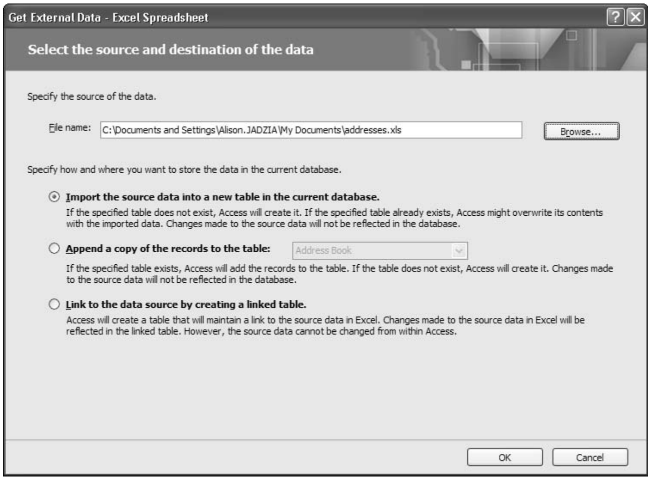
   When you've made your choice, Access displays the Get External Data dialog box (shown in Figure 4-2), where you specify the name of the file that contains the data you're importing or linking to.
3. **Use the File Name box to specify the source of the data. Click the Browse button to navigate to your data file.**

   Navigate through the folders (if necessary) to find the file that contains the data you want to use. Click the filename so that it appears in the File name box.

   If you are linking, and the file that you are linking to is not on your computer (it is on a LAN or another remote computer), use the universal naming convention (UNC) path for the file rather than using a drive letter that is mapped. The UNC path is a more reliable way for Access to locate the data. A UNC path looks like the following:

   ```
   \\server\directory\file
   ```

   You have to know the server name in order to type the UNC.



Get External Data - Excel Spreadsheet

Select the source and destination of the data

Specify the source of the data.

File name: C:\Documents and Settings\Alison.JADZIA\My Documents\addresses.xls

Specify how and where you want to store the data in the current database.

● **Import the source data into a new table in the current database.**
If the specified table does not exist, Access will create it. If the specified table already exists, Access might overwrite its contents with the imported data. Changes made to the source data will not be reflected in the database.

○ **Append a copy of the records to the table:** Address Book
If the specified table exists, Access will add the records to the table. If the table does not exist, Access will create it. Changes made to the source data will not be reflected in the database.

○ **Link to the data source by creating a linked table.**
Access will create a table that will maintain a link to the source data in Excel. Changes made to the source data in Excel will be reflected in the linked table. However, the source data cannot be changed from within Access.

Figure 4-2: The Get External Data dialog box.

4. **Choose how you want to store the data in the current database.**

   You can Import the data into a new table in the current database, Append the data to an existing table (all the fields must correspond exactly for this option to work), or Link to the data outside Access. The advantages and disadvantages to each of these options have been discussed in this chapter.

5. **Click OK.**

   Depending on the type of file you're working with, you may see a wizard that guides you through the process of choosing the data you want to import or link to.

   The windows you see depend on the type of file that contains the data you're importing or linking to. (The following sections guide you through the Text and Spreadsheet Wizards.)

   Other data types (including `.dbf`) immediately import, ready for use.

When the import or link is complete, you see a new table listed in the Database window. Imported tables appear just like other tables, and you use them like any other table — you can change field names and properties, create relationships, enter data, and edit data. Linked tables appear with an arrow and an icon, indicating the type of file that the link is to (such as dB for dBASE, X for Excel, and a fox for FoxPro).

REMEMBER

You can use most linked tables like any table in the database — some types, however, are read-only, and you can't enter and edit data. You cannot change field properties or enforce referential integrity for linked tables.

The following sections provide details on using the Import and Link Wizards for text and spreadsheet files. You may see Import Wizards for other types of files too, files that are similar to the text and spreadsheet files in the information they need — Access wants to know how to get to and use the file, and how to break the data into fields.

Importing text or spreadsheet data

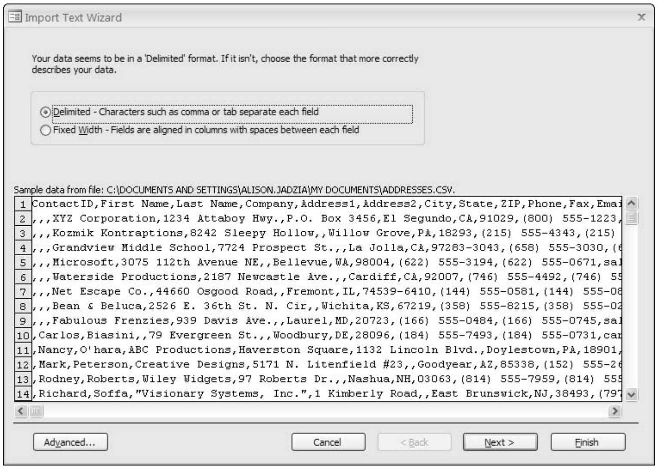
If you import or link a text file, the Import Text Wizard or Link Text Wizard starts when you select the appropriate file using the Get External Data dialog box. The two wizards are very similar, but the Link Text Wizard has fewer steps.

Are you importing a whole worksheet? If not, you may want to create a named range in the spreadsheet to make importing exactly the data that you need easier. Access uses the first eight rows of data to determine the data type. If Access happens to select the wrong data type (based on the first eight rows), format the cells in your spreadsheet to the correct data type. For instance, if the first eight ZIP codes start with a digit other than zero, Access will format them as numbers. To keep the leading zero, format them in Excel as text.

Follow these steps to complete the Text Wizards:

1. **In the first wizard window (shown in Figure 4-3), select the Delimited option or the Fixed Width option to describe how your data is divided up, and then click the Next button.**

   The Delimited option is for situations where commas, tabs, or other characters separate each field, whereas the Fixed Width option is for situations in which spaces make the columns line up.



Your data seems to be in a 'Delimited' format. If it isn't, choose the format that more correctly describes your data.

● Delimited - Characters such as comma or tab separate each field
○ Fixed Width - Fields are aligned in columns with spaces between each field

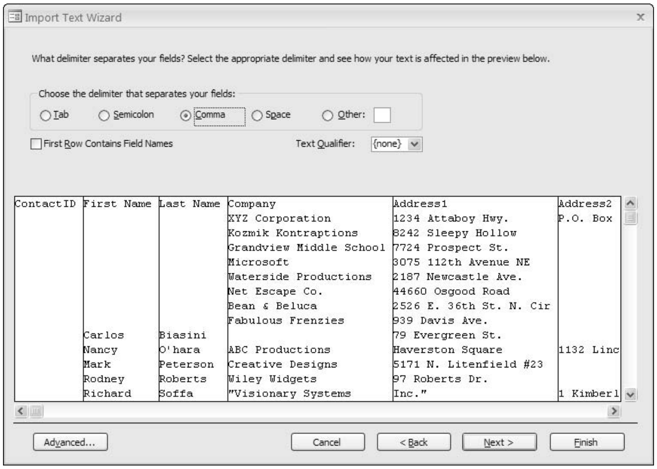
Sample data from file: C:\DOCUMENTS AND SETTINGS\ALISON.JADZIA\MY DOCUMENTS\ADDRESSES.CSV.

```
 1 ContactID,First Name,Last Name,Company,Address1,Address2,City,State,ZIP,Phone,Fax,Emai
 2 ,,,XYZ Corporation,1234 Attaboy Hwy.,P.O. Box 3456,El Segundo,CA,91029,(800) 555-1223,
 3 ,,,Kozmik Kontraptions,8242 Sleepy Hollow,,Willow Grove,PA,18293,(215) 555-4343,(215)
 4 ,,,Grandview Middle School,7724 Prospect St.,,La Jolla,CA,97283-3043,(658) 555-3030,(6
 5 ,,,Microsoft,3075 112th Avenue NE,,Bellevue,WA,98004,(622) 555-3194,(622) 555-0671,sal
 6 ,,,Waterside Productions,2187 Newcastle Ave.,,Cardiff,CA,92007,(746) 555-4492,(746) 55
 7 ,,,Net Escape Co.,44660 Osgood Road,,Fremont,IL,74539-6410,(144) 555-0581,(144) 555-08
 8 ,,,Bean & Beluca,2526 E. 36th St. N. Cir,,Wichita,KS,67219,(358) 555-8215,(358) 555-02
 9 ,,,Fabulous Frenzies,939 Davis Ave.,,Laurel,MD,20723,(166) 555-0484,(166) 555-0745,sal
10 ,Carlos,Biasini,,79 Evergreen St.,,Woodbury,DE,28096,(184) 555-7493,(184) 555-0731,car
11 ,Nancy,O'hara,ABC Productions,Haverston Square,1132 Lincoln Blvd.,Doylestown,PA,18901,
12 ,Mark,Peterson,Creative Designs,5171 N. Litenfield #23,,Goodyear,AZ,85338,(152) 555-26
13 ,Rodney,Roberts,Wiley Widgets,97 Roberts Dr.,,Nashua,NH,03063,(814) 555-7959,(814) 555
14 ,Richard,Soffa,"Visionary Systems, Inc.",1 Kimberly Road,,East Brunswick,NJ,38493,(797
```

Figure 4-3: The Import (or Link) Text Wizard can turn data like this into fields and records.

2. **Further define where one field ends and the next begins in the second window. When done choosing your options, click the Next button.**

   If you choose the Delimited option in Step 1, you see Figure 4-4, which asks you what character separates your fields (choose from the options or use the Other option to specify the character used). Also specify whether the first row contains field names, and whether you're using a *text qualifier* (symbols that surround text, such as double or single quotation marks). Your data is shown with vertical lines to separate fields.



Import Text Wizard

What delimiter separates your fields? Select the appropriate delimiter and see how your text is affected in the preview below.

Choose the delimiter that separates your fields:

○ Tab ○ Semicolon ● Comma ○ Space ○ Other: □

□ First Row Contains Field Names Text Qualifier: {none}

ContactID	First Name	Last Name	Company	Address1	Address2
			XYZ Corporation	1234 Attaboy Hwy.	P.O. Box
			Kozmik Kontraptions	8242 Sleepy Hollow	
			Grandview Middle School	7724 Prospect St.	
			Microsoft	3075 112th Avenue NE	
			Waterside Productions	2187 Newcastle Ave.	
			Net Escape Co.	44660 Osgood Road	
			Bean & Beluca	2526 E. 36th St. N. Cir	
			Fabulous Frenzies	939 Davis Ave.	
	Carlos	Biasini		79 Evergreen St.	
	Nancy	O'hara	ABC Productions	Haverston Square	1132 Linc
	Mark	Peterson	Creative Designs	5171 N. Litenfield #23	
	Rodney	Roberts	Wiley Widgets	97 Roberts Dr.	
	Richard	Soffa	"Visionary Systems	Inc."	1 Kimberl

Figure 4-4: Help Access figure out where each field in your delimited text file begins and ends.

   If you choose the Fixed Width option, you see a similar window, which shows you where Access guesses the field breaks go. If Access is wrong about the field breaks, fix them. Create a break by clicking, delete a break by double-clicking, or move a break by dragging.

   If you are linking to a text file, skip to Step 6.

3. **In the next window, click a column in the displayed data to change properties for that field, and then click the Next button.**

   For example, you can further define each field by typing a field name; choose the data type, whether or not to index the field, and specify whether to skip importing or linking to this particular field.

   TIP

   You don't have to complete this information for each field — you can go with the choices Access made.

4. **In the next window, either select a primary key field, let Access create a new AutoNumber field as the primary key, or specify that the field doesn't have a primary key field. When you've finished your selections, click the Next button.**

5. **In the last window that appears, name the table by typing a name in the Table Name box, and then click the Finish button.**

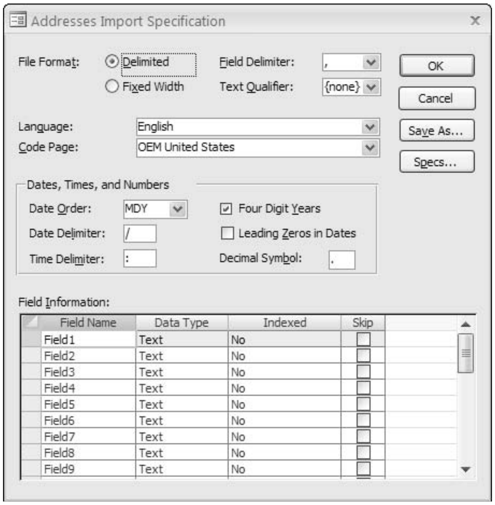
   The last window of the Import Text Wizard contains a check box that runs the Table Analyzer Wizard. If you choose to have a wizard analyze the table, the Table Analyzer Wizard looks for duplicated data and recommends how to create multiple related tables that don't contain repeated data. You may also choose to display the Access Help system when the wizard is done.

   After you click Finish, Access creates the new table and lists it in the Database window.

TIP

Click the Advanced button in the last window of the wizard to display the Import Specification or Link Specification dialog box again. If this is an import or link that you may want to repeat, save the specs (using the Save As button).

The Import Specification dialog box, shown in Figure 4-5, displays all the specifications for the text-file import. You can edit these specs, save them, or import specs that you created and saved when you did another text-file import. This dialog box has options that you've seen before in the wizard (such as those for file format, field delimiter, and text qualifier), as well as the following options:



Addresses Import Specification

File Format: ● Delimited ○ Fixed Width

Field Delimiter: ,

Text Qualifier: {none}

Language: English

Code Page: OEM United States

Dates, Times, and Numbers

Date Order: MDY

Date Delimiter: /

Time Delimiter: :

☑ Four Digit Years

☐ Leading Zeros in Dates

Decimal Symbol: .

Field Information:

Field Name	Data Type	Indexed	Skip
Field1	Text	No	☐
Field2	Text	No	☐
Field3	Text	No	☐
Field4	Text	No	☐
Field5	Text	No	☐
Field6	Text	No	☐
Field7	Text	No	☐
Field8	Text	No	☐
Field9	Text	No	☐

Figure 4-5: The Import Specification dialog box saves the options so you can import your file faster next time.

- **Language:** Select the language for the text in your table.
- **Code Page:** Select a code page. Just keep the default selection unless you know for certain that the imported data is using one of the other available options.

- **Date Order:** MDY (month/day/year) is standard, but you can select another option as needed to match your date data.
- **Date Delimiter:** Type in the character used to separate month, day, and year.
- **Time Delimiter:** Type in the character used to separate hours and minutes.
- **Four Digit Years:** Deselect this option if your data uses only two digits to designate the year.
- **Leading Zeros in Dates:** Select this option if your data has zeros before single-digit months (for example, `02` for February).
- **Decimal Symbol:** Type in the character used as a decimal point. In the United States, the decimal symbol is a period, but in many European countries, the decimal is a comma.
- **Field Information:** Lists the field name in the file you are importing or linking (click to edit), the data type that Access has chosen (change by choosing from the drop-down list), whether the field is indexed (change by choosing from the drop-down list), and a check box if you want to skip the field.
- **Save As:** Saves the Import Specifications settings (or Link Specifications) for use with a later import or link.
- **Specs:** Lists saved specs that you can select from.

When you're done setting your options, click the OK button.

The Import Spreadsheet and Link Spreadsheet Wizards

If you import or link a spreadsheet file, the Import Spreadsheet Wizard or Link Spreadsheet Wizard starts when you select the appropriate file using the Get External Data dialog box. Follow these steps to complete the Spreadsheet Wizards:

REMEMBER

1. **Select the sheet that contains your data in the first window that appears (as shown in Figure 4-6), and then click the Next button.**

   You can only import or link to data on one sheet at a time. Use the Show Named Ranges option to see named ranges in the spreadsheet.

2. **In the second window of the wizard, tell Access whether the first row contains column headings and then click the Next button.**

3. **In the next window, change properties as necessary for each column: Click a column in the displayed data, change properties for that field at the top of the window, and then click Next when you're happy with the properties for all the fields.**

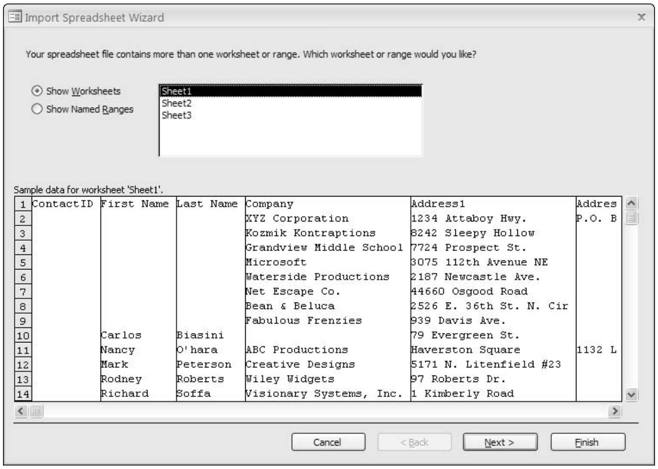
This window allows you to further define each field by typing a field name, choosing data type, choosing whether to index the field, and choosing to skip importing or linking to this particular field. You don't have to complete this information for each field — you can go with the choices Access made.

4. **In the next window, either select a primary key field, let Access create a new AutoNumber field as the primary key, or specify that the table doesn't have a primary key field. When you finish your selections, click the Next button.**

5. **In the last window, name the table and then click the Finish button.**

   The last window of the wizard contains a check box that runs the Table Analyzer Wizard. If you choose to have the wizard analyze the table, the Table Analyzer Wizard looks for duplicated data and recommends ways to create multiple related tables that don't contain repeated data. You may also choose to display the Access Help system when the wizard is done.

   When the wizard finishes, you see the database window with your new table listed.



Your spreadsheet file contains more than one worksheet or range. Which worksheet or range would you like?

● Show Worksheets
○ Show Named Ranges

Sheet1
Sheet2
Sheet3

Sample data for worksheet 'Sheet1'.

1	ContactID	First Name	Last Name	Company	Address1	Addres
2				XYZ Corporation	1234 Attaboy Hwy.	P.O. B
3				Kozmik Kontraptions	8242 Sleepy Hollow	
4				Grandview Middle School	7724 Prospect St.	
5				Microsoft	3075 112th Avenue NE	
6				Waterside Productions	2187 Newcastle Ave.	
7				Net Escape Co.	44660 Osgood Road	
8				Bean & Beluca	2526 E. 36th St. N. Cir	
9				Fabulous Frenzies	939 Davis Ave.	
10		Carlos	Biasini		79 Evergreen St.	
11		Nancy	O'hara	ABC Productions	Haverston Square	1132 L
12		Mark	Peterson	Creative Designs	5171 N. Litenfield #23	
13		Rodney	Roberts	Wiley Widgets	97 Roberts Dr.	
14		Richard	Soffa	Visionary Systems, Inc.	1 Kimberly Road	

Figure 4-6: The Import Spreadsheet Wizard.

Getting contacts from Outlook into Access

You can import contacts from Outlook into an Access table. Here's how:

1. **Click the More button in the Import group of the External Data tab on the Ribbon to find the Outlook Folder button. Then click this button.**

   Access displays the Get External Data dialog box, where you can choose to Import the data into a new table, append the data to an existing table, or link to the data (that is, create a new, linked table). Access then asks you to choose a folder or address book to import from. It will look only at the Outlook files on your computer (there seems to be no way to look at Outlook files available through network connections). The same rules apply for appending data to an existing table — the field names and data types must be the same in the imported data as in the existing table. The details on how to do this are in this chapter, at the beginning of the section on importing and linking data.

2. **Choose between importing from your Outlook Address Book and your Contacts folder.**

   If you're not sure which you need, it's easy enough to try one and then switch if you find you need the other (click Next to see the data, then click Back to return to select a different folder).

3. **After you have chosen a folder, click Next to see the data.**

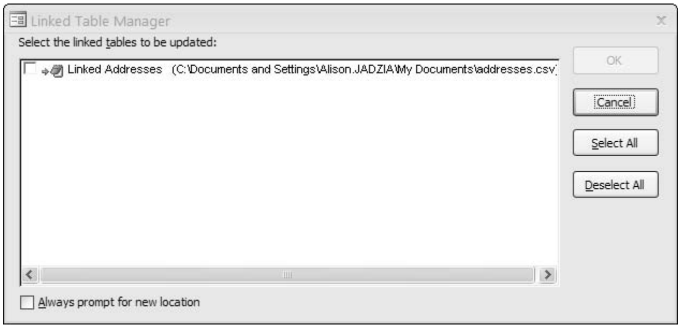
   From this point, the import is identical to importing text or spreadsheet data. Access shows you the data and allows you to choose the fields you want. Outlook Contacts creates redundant fields, so check that you have what you need, and skip those that you don't (select the field and click the Do Not Import Field check box). Empty fields (which are displayed as narrow columns) are created in a new Access table. If you don't want them, be sure to check the *Do not import field* check box. Alternatively, you can delete the empty fields in Access.

Managing links

If you create links to external data sources, you may need to manage those links. For instance, when data changes in the source, you can tell Access to get the new data — and if the source file moves, you have to tell Access where to find it. Use the Linked Table Manager to manage your links:

1. **Display the Database Tools tab on the Ribbon and click the Linked Table Manager button in the Database Tools group.**

   Access displays the Linked Table Manager, as shown in Figure 4-7.



Linked Table Manager

Select the linked tables to be updated:

□ Linked Addresses (C:\Documents and Settings\Alison.JADZIA\My Documents\addresses.csv)

□ Always prompt for new location

Figure 4-7: The Linked Table Manager.

2. **Select the check box(es) for the table(s) whose links you want to refresh, and then click OK.**

   Access refreshes the data in the selected tables, using the external file listed in the table. If the external file isn't found, you see the Select New Location Of dialog box, where you can specify the new location. If more than one table was not found, Access searches the new location for all the missing tables.

   If you want Access always to ask you where the files are, select the Always Prompt for New Location check box before you click OK to update your data.

Cleaning up your imported data

If you import large amounts of data, you may need to clean it up a bit to make it efficient for use in Access. (If you have any doubt about what clean data looks like, review Book I, Chapter 4 on designing databases.)

One useful tool for cleaning up imported data is the Table Analyzer Wizard. This wizard looks for repeated data to determine whether to break a table into two or more tables. The various Import Wizards offer to run the Table Analyzer Wizard. You can also run it by selecting the table you want to analyze in the Navigation Pane, or opening that table and clicking the Analyze Table button on the Database Tools tab of the Ribbon.

REMEMBER

If you decide not to use the Table Analyzer Wizard, you may want to inspect your data for duplicate data. The primary key field cannot have duplicate data.

Your new table may need relationships defined with other tables in the database (see Chapter 6 of this minibook, for more on relationships). You may also want to edit the table name or field names, and fields may need some fine-tuning — you can use the Design view to edit data type and properties (Chapter 1 of this minibook).

Running and scheduling saved imports

If you have saved the definition of an import or export operation while using the appropriate wizard, you have the option of running the same import or export again. Click the Saved Exports button in the Export group of the External Data tab on the Ribbon to open the Manage Data Tasks dialog box. Here you can see all saved import and export definitions. (There are two tabs — one for Saved Imports and one for Saved Exports.) From this dialog box, you can run an operation, create an Outlook task, or delete a saved operation. You also have the option of changing the source or destination file — click the file name to change it.

If you create a task in Outlook, you can go to the Outlook task to add a date or define recurrence. You can run the task straight from Outlook by clicking the Run Export or Run Import button on the Ribbon when the Outlook task is open.

Getting Data from Another Access Database

If the data you need is already in an Access database, decide whether you want to import it or link to it. You can also use the procedure below to import another database object (such as a query, form, report, and so on.)

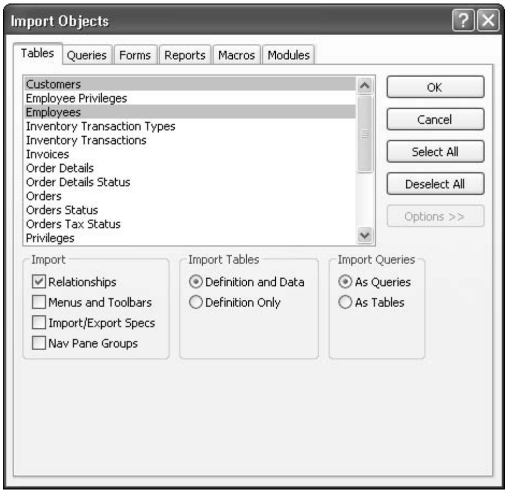
If you want to import (or link to) a table and all its data from another Access database, the process is simple — follow these steps:

1. **Open the database where you want to use the data.**
2. **Click the Access button in the Import group of the External Data tab on the Ribbon.**

   Access displays the Get External Data dialog box.
3. **Browse to the database that has the object you need.**
4. **Choose Import or Link. Either option results in a new database object — there is no option that appends data to an existing table.**

   If necessary, you can use the Append Query to combine two tables after you have imported the data.
5. **Click OK.**

   Access displays the Import Objects dialog box shown in Figure 4-8 (or the similar Link Tables dialog box).



Customers
Employee Privileges
Employees
Inventory Transaction Types
Inventory Transactions
Invoices
Order Details
Order Details Status
Orders
Orders Status
Orders Tax Status
Privileges

Import
☑ Relationships
☐ Menus and Toolbars
☐ Import/Export Specs
☐ Nav Pane Groups

Import Tables
● Definition and Data
○ Definition Only

Import Queries
● As Queries
○ As Tables

Figure 4-8: The Import Objects dialog box allows you to import database objects from another Access database.

6. **Select the table you want from the Tables tab.**

   To select multiple objects, use Ctrl+click and/or Shift+click. Click the Select All button to select all objects displayed on the current tab (for instance, all tables). Click the Deselect All button to deselect all objects on the current tab.

   Click the Options button and choose the Definition Only option if you don't want to import the data, just the table definition (table properties and field definitions).

7. **Click OK to import the objects (or create the link).**

   The new objects appear in the Database window. You can view and edit them just as you would any other database object.

You can use this method to import any database object — not just tables.

Getting Data Out of Access

You can export any object from an Access database to another Access database — or to a file that isn't an Access file (a dBASE or Excel file, for example). You can also use this technique to create a static HTML file.

Exporting is a convenient way to go about moving data from one Access database to another. You can also export an object without any data — for instance, if you want to reuse a query definition. Exporting is similar to importing — the difference is which database you have open when you start.

You can even save your export definition if you export data to another application frequently. Notice the Save Exports button in the Export group of the External Data tab on the Ribbon.

To export an object, follow these steps:

1. **Open the database that contains the object you want to export.**

   You can export a table with or without the data in it. You may also want to export a query with its data — which allows you to get specific information from your database.

2. **Select the object name in the Navigation Pane.**
3. **Display the External Data tab on the Ribbon.**

   Find the Export group of the tab.

4. **Click the button for the format you want to export to.**

   There are buttons for Excel, SharePoint List, PDF or XPS, Word, and Text file. The More button displays export options for Access, XML, ODBC, HTML, dBASE, Paradox, Lotus 1-2-3, and mail merge with Microsoft Word.

5. **Select the file or type a name for a new file to which you want to save the object by typing the name in the File Name box. Use the Browse button to choose a folder.**

   You may also need to select a file format, depending on the application you are exporting to. You can export to an existing Access database, but when you export to other file types, you create a new file (which you can then import into an existing file, if needed).

6. **Click OK.**

   What happens next depends on where the data is going:

   - If you're exporting to a file type other than an Access database, the object is exported.
   - If you're exporting to an existing Access file, you see the Export dialog box, where you can rename the object (if you want to) and tell Access whether you want to export all the data or just the object definition (field names, format, and any expressions).
   - When you save a report to HTML, Access asks you for the name of the HTML template file. You can find out about HTML template files from the Access Help system.

   Access quietly completes the export process and asks whether you want to save the export.

7. **If this is an export you will do again, select Save Export Steps to see additional options.**

   You'll have to name the export; we encourage you to make use of the Description field to describe the specifics of the export. (What does it do? When should it be used?) You also have the option of creating an Outlook task to remind you to repeat the export.

   You can make the Outlook task recur if you go into Outlook, choose the task, and click the Recurrence button.

8. **To see whether the operation worked, open the file to which you exported the object.**

Collecting Data with Outlook

Access 2007 allows you to collect data with an e-mail. You can send a form out via Outlook, and then easily process the replies as you add the collected data to your database.

Before you begin the process of creating an e-mail message to collect data, you need a table or query in which to store the data. You may use an existing table or query, or create a new one. A query is a good way to collect data for more than one related table — create the query before starting the process of creating the e-mail. When you create the e-mail, you have the opportunity to select the fields you want to collect data for, so your table may contain more fields than you ask your recipients to fill in.

Another option with the data-collection feature is sending out existing data for users to verify. For instance, you can mail out contact information using the e-mail address in each record, and ask the recipients to edit or add to it. This option allows recipients to edit the information, and also to add new information. Note, however, that

- The recipients' e-mail addresses must be stored in the table beforehand if you're going to use this option.
- Data can be updated for only a single table.
- You cannot collect or edit fields that are Attachment type, AutoNumber, Multi-valued, or OLE.

In order to collect data through Outlook, you must have Access 2007 *and* Outlook 2007. You may also want to use InfoPath 2007, as the InfoPath form is easier to use. However, if you choose this option, all your recipients need InfoPath 2007 as well — choosing the HTML form is safer (it doesn't require recipients to have the extra software). If you don't use InfoPath, recipients don't even need Outlook 2007, and they definitely don't need Access. They do, however, need an e-mail client that can read HTML e-mails. Here we cover how to collect data with — and without — using InfoPath.

Here's how to start and use the wizard to collect data through e-mail:

1. **To start the process, right-click a table name and choose Collect and Update Data via E-mail, or click the Create E-Mail button in the Collect Data group of the External Data tab on the Ribbon.**

   The wizard starts and shows you a page that lists the six steps for gathering data through e-mail messages.

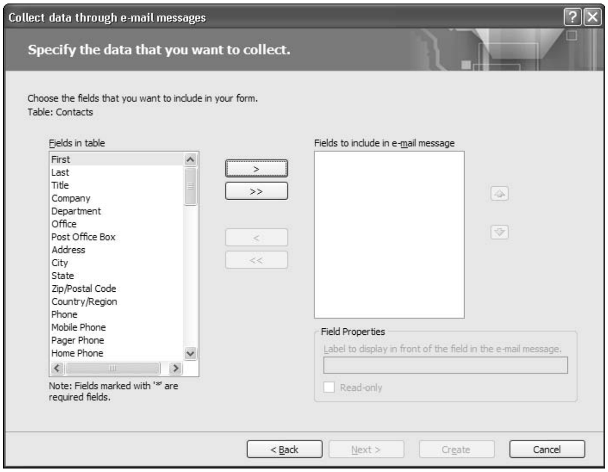
2. **Click Next to choose the type of form you want to send.**
3. **Choose HTML form. Click Next.**

   InfoPath provides many more features — including drop-down controls and in-form validation. Although HTML supports these types of controls, they are blocked by most firewalls and e-mail gateways and can't generally be used in e-mail. The HTML forms are simpler, and can be used by recipients without Access and Infopath.

   The next page of the wizard asks you whether you want to collect new information or update existing information.

   Notice that to update existing information, the recipients' e-mail addresses must be part of the table. The update option is useful if you need people to review and update one record of information.

4. Select the fields that you want to collect, using the wizard page shown in Figure 4-9. When you've selected all the fields you want to include in the e-mail, click Next.


Collect data through e-mail messages

Specify the data that you want to collect.

Choose the fields that you want to include in your form.
Table: Contacts

Note: Fields marked with '*' are required fields.

Figure 4-9: Select the fields you want to collect.

Click the single arrow to move one field at a time, and the double arrow to move them all. The field names that appear in the box on the right are those that will be included in the e-mail. You can change the name that the recipient sees by selecting the field name in the rightmost box and then changing the Label displayed in the Field Properties box.

Required fields are those whose Required property is set to `Yes`. The Read-only option allows you to send a field for the recipient to see, but not update.

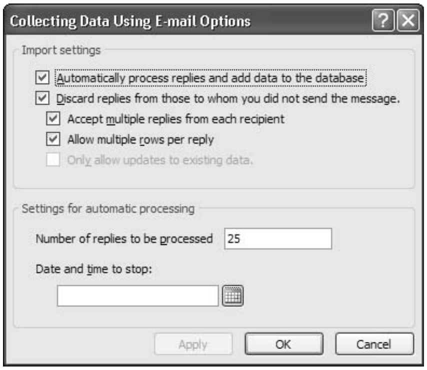
5. Specify how to process replies.

Generally, you'll want to select Automatically Process Replies And Add Data To *Tablename*. When data is automatically processed, it is added to your Access table when Outlook and Access are open and responses are received. (Additionally, for responses to be processed automatically, the database must not be password protected, should be open in Exclusive mode, and the name and location of the database, requested fields, and relevant tables must not have changed, and you need to have the required permissions to add or update the tables or query.)

If you want to store responses in a folder with a name other than Access Data Collection Replies, click that folder link and then create a new folder, or rename the folder. (You can get to the folder by clicking the + next to Inbox on the Select Folder dialog box.)

You may want to change some collection options. Click the Set Properties To Control The Automatic Processing link to see the Collecting Data Using E-Mail Options dialog box shown in Figure 4-10.

If you choose to process replies manually, you must select each reply in Outlook, right-click, and choose Export data to Microsoft Access. You can manually process replies that fail to be automatically processed. If you allow multiple replies from each recipient, second and subsequent replies must be manually processed.



Collecting Data Using E-mail Options

Import settings

☑ Automatically process replies and add data to the database

☑ Discard replies from those to whom you did not send the message.

☑ Accept multiple replies from each recipient

☑ Allow multiple rows per reply

□ Only allow updates to existing data.

Settings for automatic processing

Number of replies to be processed 25

Date and time to stop:

Figure 4-10: Set properties for processing e-mails containing data.

6. **Select e-mail addresses either by using addresses from Outlook (where you can type in addresses that aren't in your Outlook address book), or by using addresses stored in a field in the database. (If you are updating rather than adding data, this option doesn't appear.)**

   You guessed it — more options:

   - If you choose Outlook addresses, the next window you see allows you to customize the e-mail with a title and introductory text. Then the wizard creates the e-mail, and you can send it to your selected recipients using Outlook. (You type or select recipients in Outlook, too). You can also alter the e-mail using Outlook.
   - If you choose addresses stored in the database, the next wizard window asks you to identify the field that contains the addresses. You can choose from the current table or query, or another table in the database.
   - If you are choosing to use e-mail addresses from an associated table, first select the field in the current table that joins it to the table with the addresses. This is probably an ID field — the primary key in one of the two tables. The next step depends on whether there is more than one table associated with the original table. If not, simply select the name of the field with the e-mail addresses. If there is more than one table, first select the table, then select the field.

When you use addresses from the database, you cannot preview or customize the e-mail in Outlook.

7. **That's just about it! Depending on how addresses are being added to the e-mails, you either:**

   - Click Create to create the e-mail if you are adding addresses in Outlook. The e-mail form will open in Outlook, and you can add addresses and send the e-mail as you usually do in Outlook.
   - If you are using e-mail addresses from the database, you see a list of recipients with check boxes. Uncheck a box to skip sending the e-mail to a recipient. Click Send to send the e-mails.

   If you see any error messages on the final page of the wizard, you can use the Back button to go back and make corrections.

Click the Manage Replies button in the Collect Data group of the External Data tab on the Ribbon to see a summary of data-collection e-mails you have sent. This dialog box gives you the option of resending the message, and allows you to change the collation options on the Collecting Data Using E-mail Options dialog box.

If replies are being processed automatically, you will see new data in the table you specified as replies are processed. If you are manually managing replies, you can display the folder where replies are being stored, right-click each message and choose Export Data to Microsoft Access. If you allow multiple replies from each recipient, second and subsequent replies must be manually processed.

The Access Help system has comprehensive help on sending e-mails to collect data.

Chapter 5: Avoiding "Garbage In, Garbage Out"

In This Chapter

- **Using field properties to get the right data in the right fields**
- **Defining how data in a field looks with input masks**
- **Creating drop-down lists with lookup fields**
- **Filtering data with validation rules**

Let's face it: If the data that goes into your database through tables and forms is garbage, then any output or analysis you do with queries and reports will give you garbage too. Fortunately, Access offers lots of tools to help you make sure that the data that goes in each field is the data that's supposed to go in that field.

Access provides a number of tools that help ensure that correct data gets put in your database. Of course, we're talking about avoiding mistakes as data is entered — if someone is purposefully entering erroneous data, these tools may not help much! Some of these Access features are described in other chapters, but they deserve a mention here too. The rest are exclusive to this chapter.

Finding the Right Tool to Keep Garbage Out

You can find many of the tools to keep garbage out in Table Design view. You can use the data type to keep inappropriate data out of a field, and many of the other field properties can work that way too.

REMEMBER

Field properties appear in the bottom half of Design view — make sure you're viewing the field properties for the field you're working with by clicking the field name in the top half of Design view. Field properties are also covered in Chapter 1 of this minibook.

As you define a field in Design view you can use the following field properties to make sure that the right data gets into the right field:

- ✦ **Data type:** Use the correct data type to eliminate data of the wrong type. Text and Memo data types accept just about any input, so use the Number, Date/Time, or Currency data types to screen out data of a different type whenever appropriate. (See Chapter 1 of this minibook for more about choosing data types.)

REMEMBER

Although data type is technically not a field property, it appears in Design view and is your first line of defense against incorrect data.

- **`Field Size`:** Limits the number of characters. For instance, if you know that a field should never exceed four characters, set the field size to 4 characters. (See Chapter 1 of this minibook for more about field size.)
- **`Format`:** Makes the data look right. For instance, you can change text to all caps or all lowercase. Input masks, explained later in this chapter, work with the `Format` field property. (See Chapter 1 of this minibook for more about the `Format` field property.)
- **`Input Mask`:** An *input mask* limits the information allowed in a field by specifying what characters you can enter. Use an input mask when you know the form the data should take — for instance, if an order number has two letters followed by four digits. Phone numbers and ZIP codes are other examples of fields where input masks are useful. You find out lots more about input masks later in this chapter.
- **`Default Value`:** Defines a value that appears by default if no other value is entered. The default value appears in the field until another value is entered.
- **`Validation Rule`:** A rule that data must pass before it is entered. This property works with the `Validation Text` property rule. A `Validation Rule` property that applies to a whole record is in the Properties sheet. (You find more on validation rules later in this chapter.)
- **`Required`:** Specifies that the field must have a value in order for you to save the record. When no value is entered, Access doesn't create a new record when Tab or Enter is pressed, and the New Record button is grayed out. Required is also accessible from Datasheet view — it is a check box on the Datasheet tab of the Ribbon.
- **`Allow Zero Length`:** Specifies whether a zero-length entry such as `""` (quotes without a space between them) is allowed (only for Text, Memo, and Hyperlink fields). A zero-length field allows you to differentiate between information that doesn't exist, and a null value (blank) that is unknown or hasn't been entered. When this option is set, it allows a zero-length string in a required field. You may want to use an input mask to make a zero-length field look different from a null value when both are allowed.
- **`Indexed`:** When you choose to index a field, you can specify that no duplicate values are allowed in the field. This property is also accessible from Datasheet view — it is a check box on the Datasheet tab of the Ribbon.

The rules that keep your data honest and help keep bad data out are sometimes called *data-integrity* rules. You can change a field property that controls data integrity (filters out garbage data) in a field that already has data —

Access tells you (when you ask to view the datasheet) that the data-integrity rules have changed and gives you the option of checking existing data against the new rules.

REMEMBER

Access only tells you whether existing data violates the new rules — it doesn't flag the offending records in any way.

The rest of this chapter covers input masks, validation rules, and the Lookup Wizard, which allows you to create drop-down lists and pick from existing data, eliminating the possibility of misspelling a new entry.

TIP

When you use both the `Format` field property and an input mask, the field property is used and the input mask ignored.

Using Input Masks to Validate and Format Data

An *input mask* both formats the data and defines the type of characters and the order they can be entered. Input masks have two intertwined functions:

- **They format data by adding punctuation or changing the look of certain values (for example, displaying asterisks instead of the text of passwords).**
- **They block any data that doesn't fit the mold from being entered.** For instance, you can't enter twelve characters if the input mask specifies four, and you can't enter a digit followed by three letters if the input mask specifies two letters followed by two digits.

Use input masks when you know the form the data should take — for instance, a ten-digit phone number, a nine-digit ZIP code, or an item number that must be two letters followed by three or more digits. Using the input mask, you can add formatting characters — for instance, you can add parentheses and a hyphen to phone numbers, and you can change the way a value appears (for instance, by choosing to display a date as `27-sep-06` or `9/27/06`, or displaying hyphens in a Social Security number). The input mask for the field is in effect when you enter data into the field from either a datasheet or a form.

If the data in a field varies or is not easily described, the field is probably not a good candidate for an input mask. For example, street addresses come in too many formats to describe easily, so making an input mask for an `Address` field is difficult. You can create input masks for Text, Number, Date/Time, and Currency field types; other data types don't have the `Input Mask` field property.

You can use an input mask with a validation rule to protect a field from data that is incorrect or that just doesn't belong there. Validation rules give you more flexibility in limiting the data you can enter — and there's more about them later in this chapter.

Input masks are commonly defined in Design view, where they become part of the field definition, and apply in forms also. However, you can also add input masks to queries and forms where data may be entered, and the input mask is defined only for that object. In all cases, you have to add an input mask from the Design view.

Using the Input Mask Wizard

The easiest way to create an input mask is to use the Input Mask Wizard. The wizard can help you create the input mask for your data — especially if the data in the field is a common type of data, such as a phone number or a ZIP code.

If your data is similar to one of the data types in the Input Mask Wizard, you may want to use the wizard and then edit the input mask in Design view.

To create an input mask with the Input Mask Wizard, follow these steps:

1. **Display the table in Design view.**

   Right-click the table name in the Navigation ane and choose Design view.

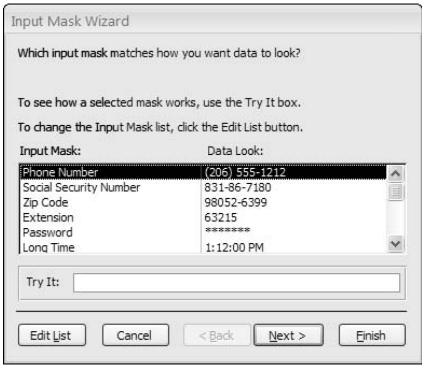
2. **Select the field you want to apply an input mask to by clicking the record selector, or put the cursor somewhere in the row for that field so that you see its field properties.**

3. **Click the `Input Mask` field property on the General tab of the field properties.**

   Access displays the Build button to the right of the Input Mask line.

4. **Click the Build button.**

   Access displays the Input Mask Wizard, shown in Figure 5-1.



Input Mask Wizard

Which input mask matches how you want data to look?

To see how a selected mask works, use the Try It box.

To change the Input Mask list, click the Edit List button.

Input Mask:	Data Look:
Phone Number	(206) 555-1212
Social Security Number	831-86-7180
Zip Code	98052-6399
Extension	63215
Password	*******
Long Time	1:12:00 PM

Try It:

Figure 5-1: The Input Mask Wizard.

5. **Select the input mask that looks the most like the data that you want to allow in the field.**

   You may see an exact match for your field, or you may see a pretty close approximation that you can edit to fit your data.

   You can add an input mask to the list displayed in the wizard by clicking the Edit List button in the first window of the Input Mask Wizard and then filling in the details of the new input mask.

6. **Click in the Try It box and type some text to see how the field appears with data in it and the input mask applied.**

   Access displays a Try It box on each window so that you can see the effect of any changes you make — click in the Try It box to see what the input mask looks like when you enter data in the field.

7. **Click Next to see more questions about the input mask.**

   The questions you see depend on the type of data you chose in the first window; you may not see all the options in the next three steps.

8. **Edit the input mask, if you want to, using the characters listed in Table 5-1 (later in this chapter).**

   Access displays the input mask it has created, and you have the opportunity to edit it.

9. **Choose a placeholder character and then click Next to see the next window of the wizard.**

   A *placeholder* is a character that holds a place for every character that the user needs to enter. Choose one from the drop-down list.

10. **Choose how to store the data and then click Next to display the final window of the wizard.**

    If you include punctuation or other additional characters in your input mask, you can choose how to save the data being entered — either save the characters entered plus the extra characters, or just the characters entered. Generally, you don't need to save the extra characters.

11. **Click Finish to tell the wizard to put the input mask it created into the `Input Mask` property for the field.**

    Access displays the Design view with the new input mask.

12. **Save the table design by clicking the Save button on the toolbar — otherwise you may lose your nifty new input mask!**

Creating an input mask manually

To create an input mask manually, enter a series of characters in the `Input Mask` property of the Field Properties pane to tell Access what kind of data to expect. Data that doesn't match the input mask cannot be entered. To block data from a field, first figure out exactly what data you want to allow in a field, and then use the characters in Table 5-1 to code the data in the Input Mask field property. If you have trouble formulating an input mask, you may find that a validation rule meets your needs better.

Table 5-1 Creating Input Masks

Input Mask Character	*What It Allows/Requires*
0	Requires a number
9	Allows a number
#	Allows a space, converts a blank to a space, allows + and -
L	Requires a letter
?	Allows a letter
A	Requires a letter or number
a	Allows a letter or number
&	Requires any character or a space
C	Allows any character or a space
<	Converts the following characters to lowercase
>	Converts the following characters to uppercase
!	Fills field from right to left, allowing characters on the left side to be optional
\	Displays the character following in the field (\Z appears as Z)
. ,	Displays the decimal placeholder or thousands separator
; : -/	Displays the date separator (the symbol used depends on the setting in the Regional Settings section of the Windows Control Panel)
Password	Creates a password-entry text box; any character typed is stored as that character but displays as an asterisk (*)

Here's how to use characters to create some common input masks:

- **AA00999:** Requires two letters or numbers followed by two digits and then allows an additional three digits.
- **00000-9999:** ZIP codes — this mask requires five digits, displays a hyphen, and provides space for an optional 4 digits.
- **L0L 0L0:** Canadian postal codes — this mask requires a letter, a number, a letter, displays a space, requires a number, a letter, and a number.
- **99:00:00 >LL:** Long time format — allows two digits, displays a colon, requires two digits, displays a colon, requires two digits, displays a space, requires two letters, which are displayed in uppercase.

Creating a Lookup Field

You want your database to be as easy to use as possible, right? But you also want data entered consistently. As orders are entered, for example, you want the name of each product entered so that Access can find it in the Products table. But what's the chance that the product name, entered as part of an order, actually matches the exact product name listed in the Products table? Pretty minimal . . . unless you create a lookup field.

A *lookup field* provides the user with a list of choices, rather than requiring users to type a value into the datasheet. You could think of it as adding a field from an existing table to your new table. Access uses the field from the other table to create a drop-down list of products that you carry for users to choose from as orders are entered. Lookup fields enable you to keep your database small and the data entered accurate and consistent. Lookup fields are very useful — and not as complicated as they sound.

The items on the drop-down list can come from a list you type, or they can be from a field in another table. Storing values for your drop-down list in a table gives you much more flexibility if you want to modify the list or store additional information about the values. (For instance, if your list contains state abbreviations, you may also decide to include full state names and even state tax rates.) Storing the drop-down list data in a table enables you to display one field (for instance, the customer's full name) and store another (such as the customer number). Working with the logical relationship you set up between tables, you can store less data — thus keeping the database compact — and entering and manipulating your data is easy. So here's the hint — in almost all cases, it's better to keep the values for your lookup in a table; it gives you much more flexibility to work with your data.

TIP

When you have two tables with a one-to-many relationship, the values of the connecting field may be perfect for a lookup field. When you enter records in the detail table (the *many* table in the relationship), the foreign key (related field) needs to match the primary key of the master (*one*) table. Consider making the foreign key in the detail table a lookup field — with the primary field in the master table providing the list of possible values. For example, if you have a Products table (the master table) and an Order Detail table (the detail table), make the `Product Code` field (or whatever field identifies the product the customer is ordering) in the Order Detail table a lookup field, using the `Product Code` field from the Products table as the list of values. (You can find more information on relationships in Book I, Chapter 4 and in Chapter 6 of this minibook.)

Using the Lookup Wizard

An easy way to create a lookup field is with the Lookup Wizard. In this example, we show you how to use the Lookup Wizard to enter the Customer ID number (stored in the Address Book table) in the `ContactID` field in the

Orders table. The Orders table lists information about each order, one record per order. Fields include the order date, the contact ID, payment, and shipping information.

Display the table you want set up to contain the lookup table in Design view and follow these steps:

1. **In the top half of Design view, find the field that you want to contain the drop-down list. Click the down arrow to display the Data Type drop-down list. Select the Lookup Wizard option.**

   Access launches the Lookup Wizard.

   Alternatively, if you haven't yet created a field that will be the lookup field, display the table in Datasheet view, click any cell in the column that will be immediately to the left of the new lookup field, and click Add Existing Field in the Fields and Columns group of the Datasheet tab on the Ribbon to launch the Lookup Wizard.

2. **Tell the wizard whether the values you want to appear on the field's drop-down list come from a field in another table or from a list that you type. Click Next.**

   TIP

   Storing the values in a table is easier, even if you have to cancel the wizard and create a new table!

   If you don't want the drop-down list to display every value in the field in another table, you can base the drop-down list on a field in a query. Find out all about queries in Book III. For instance, if you want to retain discontinued products in the Products table, but not allow those products to be entered in new orders (that is, the lookup list), you could create a query that displays only products that are currently available.

3. **Choose the name of the table (or query) that contains the data that you want to appear in the drop-down list. Click Next.**

   If you want to see queries, click the Queries button. Click the Both button to show tables and queries.

   If you tell Access that you want to type in the values, a table appears in which you can type the lookup list. Click in the table in the wizard window (which currently has only one cell), and type the first entry in the list. Press Tab — not Enter — to create new cells for additional entries. Skip to Step 7.

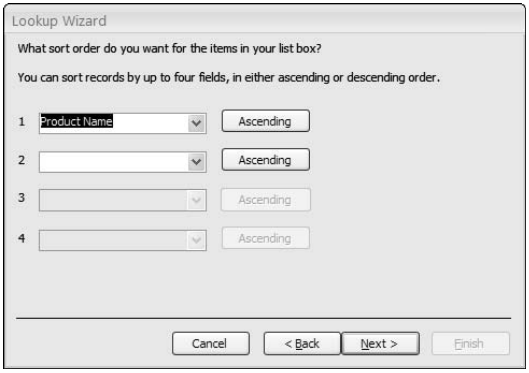
4. **Tell Access which field(s) you want to display in the drop-down list by moving field names from the Available Fields list box to the Selected Fields list box.**

   Double-click a field to move it from one column to the other. Select multiple fields to display multiple fields on the drop-down list. For instance, you may display the `First Name` and `Last Name` fields in the drop-down list.

TIP

Access always adds the primary key of the table that contains the data for the drop-down list to the list of selected fields, and it always saves the value of the primary key field. While you may see and select from another field — for instance, the `First Name` and `Last Name` fields — the primary key of the Address Book table (which is called `ContactID` in this example) is the value that is stored. Generally, this is exactly what you want (even if you don't know it). If you're sure that you don't want the primary key stored, you can customize the lookup field after the wizard finishes its business.

5. **If you select more than one field (or only one field that isn't the primary key), select a field to sort by, as shown in Figure 5-2. Then click Next.**



Lookup Wizard

What sort order do you want for the items in your list box?

You can sort records by up to four fields, in either ascending or descending order.

1 Product Name Ascending

2 Ascending

3 Ascending

4 Ascending

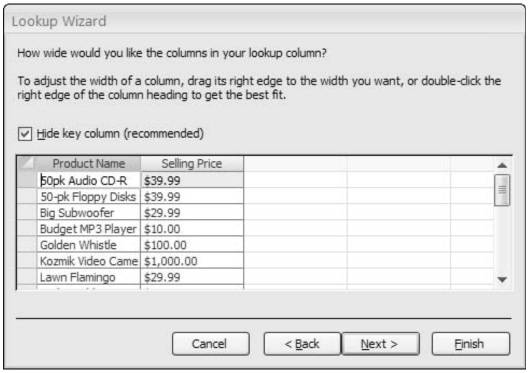
Figure 5-2: Choose fields to sort by, and then choose a sort order for each.

You can sort by up to four fields. Click the Ascending button to sort in descending order (the button toggles between ascending and descending). In this example, we sort first by last name and then by first name.

6. **Format your drop-down list — change the width of columns to fit your data, change the order of columns, and choose whether to hide or display the primary key field. Then click Next.**

This window (shown in Figure 5-3) shows you a table with the values in the lookup list. You can change the width of the columns by clicking and dragging the border between field names; to automatically fit the widest entry, double-click the right edge of the field name that appears at the top of the column. You can change the order of columns by clicking the field name to select a column and then dragging the column to a new position.

The window also contains a check box, which, when selected, hides the key field. Depending on your application, you may want to display the key field by deselecting the Hide Key Column check box.



Lookup Wizard

How wide would you like the columns in your lookup column?

To adjust the width of a column, drag its right edge to the width you want, or double-click the right edge of the column heading to get the best fit.

☑ Hide key column (recommended)

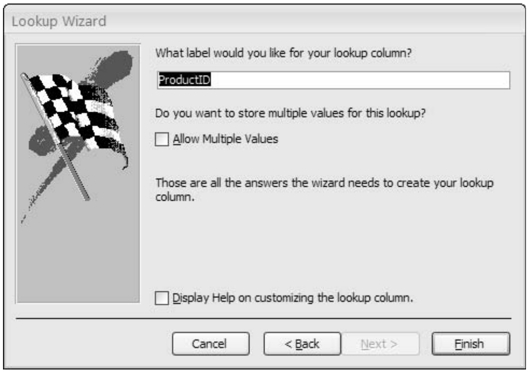
Product Name	Selling Price
50pk Audio CD-R	$39.99
50-pk Floppy Disks	$39.99
Big Subwoofer	$29.99
Budget MP3 Player	$10.00
Golden Whistle	$100.00
Kozmik Video Came	$1,000.00
Lawn Flamingo	$29.99

Figure 5-3: Change the way your lookup list looks.

7. **In the final window, change the label (the field name) for the lookup column if you want to, and choose whether you want to display help for customizing the lookup column.**

   A new option in Access 2007 enables you to allow the user to select multiple values in a lookup list. (See Figure 5-4.)

   When you have completed the options on the page, click Finish.



Lookup Wizard

What label would you like for your lookup column?

ProductID

Do you want to store multiple values for this lookup?

□ Allow Multiple Values

Those are all the answers the wizard needs to create your lookup column.

□ Display Help on customizing the lookup column.

Figure 5-4: Name the new field and decide whether you want to Allow Multiple Values.

Access may tell you that you have to save the table before relationships are created — why argue? — go ahead and save the table. A relationship is created automatically when you use the Lookup Wizard (more about that in a minute).

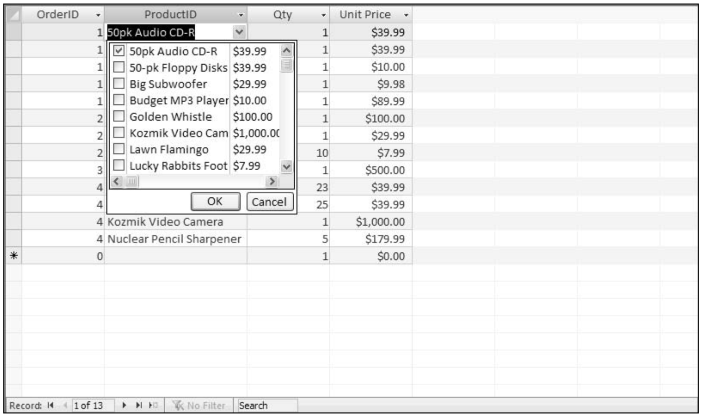
View your table in Datasheet view to see your new lookup field. When you click within the field, you see an arrow to display a drop-down list. Go ahead and display the list. (Ours is shown in Figure 5-5.)

The default setting allows users to choose from the drop-down list or type in a value. To force users to choose from the drop-down list (or to enter a value that's on the drop-down list), click the Lookup tab in the field properties and change the `Limit to List` property from the `No` setting to the `Yes` setting. Figure 5-6 shows Lookup properties. You may also want to enforce referential integrity, as covered in Chapter 6 of this minibook.

Using the Lookup Wizard creates a relationship between the table containing the lookup field and the table containing the data shown in the drop-down list for the lookup field — in our example, the relationship is between the `ContactID` field in the Orders table and the `ContactID` field in the Address Book table. If you display the Relationships window (click the Relationships button on the Database or Database Tools tab of the Ribbon), you see the relationship that the Lookup Wizard created. (You can find out more about relationships in Chapter 6 of this minibook.)

When to use the Allow Multiple Selections option

When you select the Allow Multiple Selections check box in the Lookup Wizard, your lookup list looks like Figure 5-5. Access creates a hidden join table to store the many-to-many relationship between the two tables — in this case, the Products table and the Orders table — involved in the lookup.



	OrderID	ProductID	Qty	Unit Price
	1	50pk Audio CD-R	1	$39.99
	1		1	$39.99
	1		1	$10.00
	1		1	$9.98
	1		1	$89.99
	2		1	$100.00
	2		1	$29.99
	2		10	$7.99
	3		1	$500.00
	4		23	$39.99
	4		25	$39.99
	4	Kozmik Video Camera	1	$1,000.00
	4	Nuclear Pencil Sharpener	5	$179.99
*	0		1	$0.00

☑	50pk Audio CD-R	$39.99
□	50-pk Floppy Disks	$39.99
□	Big Subwoofer	$29.99
□	Budget MP3 Player	$10.00
□	Golden Whistle	$100.00
□	Kozmik Video Cam	$1,000.0(
□	Lawn Flamingo	$29.99
□	Lucky Rabbits Foot	$7.99

Figure 5-5: The user can select multiple options in this drop-down list.

Allowing multiple selections in a lookup field can be a tremendously convenient feature. If you are tracking issues, and the same issue is reported by multiple clients, you can create a lookup list to enter that data quickly and easily. In the case in Figure 5-5, however, allowing multiple selections in a lookup field is not the correct choice. Customers may order more than one of any product — and the drop-down list does not allow that to be entered. Instead, you need a table that lists each item ordered and also contains a field for the quantity ordered. This intermediate table is the join table in the many-to-many relationship between orders and products. Although it's more work to set up the join table yourself, in many situations it is the right choice to make. You can then create a form to make data entry as quick as it would be with a multiple-selection lookup field.

Modifying the lookup list

Adding values to an existing lookup list is pretty easy. If the lookup list gets its values from a table, just add records to the table to see additional choices in the lookup list. If you typed values for the lookup list yourself, switch to Design view, click the field with the lookup, and click the Lookup tab in the field properties (refer to Figure 5-6). You can add options to the `Row Source` property — just be sure to separate the values with semicolons.

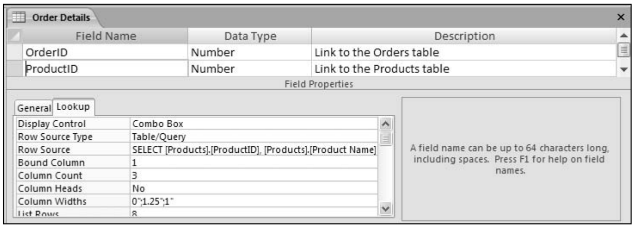


Figure 5-6: You can use the Lookup tab in the field properties to edit the lookup field.

Order Details

Field Name	Data Type	Description
OrderID	Number	Link to the Orders table
ProductID	Number	Link to the Products table

Field Properties

General Lookup

Display Control	Combo Box
Row Source Type	Table/Query
Row Source	SELECT [Products].[ProductID], [Products].[Product Name]
Bound Column	1
Column Count	3
Column Heads	No
Column Widths	0";1.25";1"
List Rows	8

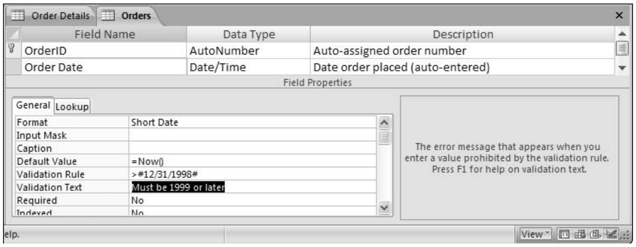
A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Validating Data As It's Entered

Often, you are able to formulate a rule that data must pass before being entered in a certain field. For instance, you may know that the date is not before 1999, that the price is zero or greater, or that the entry must be five characters and begin with P. The `Validation Rule` field property (in the field properties) enables you to specify a rule that data in a single field must pass in order to be entered in a particular field. Field validation rules are entered in the `Validation Rule` property for the field. Figure 5-7 shows a validation rule for the `Order Date` field.

If you just want to require that a value be entered, set the `Required` field property to the `Yes` setting.

You can also specify a validation rule for a record (rather than a field). Record validation allows you to create a rule to prevent internal inconsistency in a record — for instance, you may want to check that the ship date is not before the order date. You can enter record-validation rules in the `Validation Rule` property, one of the table properties. Display Table Properties by clicking the Property Sheet button on the Design tab (when the Table Design view is displayed)). Figure 5-8 shows a record validation rule.

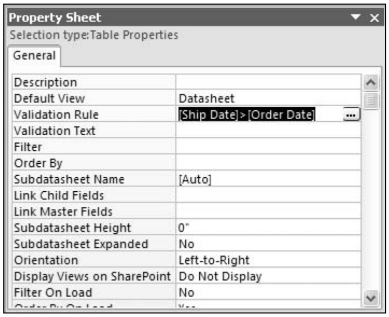


Field Name	Data Type	Description
OrderID	AutoNumber	Auto-assigned order number
Order Date	Date/Time	Date order placed (auto-entered)

Format	Short Date
Input Mask	
Caption	
Default Value	=Now()
Validation Rule	>#12/31/1998#
Validation Text	Must be 1999 or later
Required	No
Indexed	No

The error message that appears when you enter a value prohibited by the validation rule. Press F1 for help on validation text.

Figure 5-7: The Order Date field uses a validation rule to make sure the date is after December 31, 1998.



Selection type: Table Properties

Description	
Default View	Datasheet
Validation Rule	[Ship Date]>[Order Date]
Validation Text	
Filter	
Order By	
Subdatasheet Name	[Auto]
Link Child Fields	
Link Master Fields	
Subdatasheet Height	0"
Subdatasheet Expanded	No
Orientation	Left-to-Right
Display Views on SharePoint	Do Not Display
Filter On Load	No

Figure 5-8: Use the `Validation Rule` property on the Table property sheet to establish a rule for the record.

Table 5-2 shows a few examples of validation rules. If you have a complicated validation rule, read up on creating expressions. Use expressions the same way in validation rules as you do in query criteria. If the expression is true, then the data can be entered; if the expression is false, the validation text displays and the data cannot be entered. Criteria are covered in Book III, Chapter 1. (Expressions are covered in detail in Book III, Chapter 2.) The Build button that appears next to the Validation Rule box when you are entering a rule displays the Expression Builder, which is also covered in Book III, Chapter 2.

Table 5-2 Validation Rule Examples

Rule for the Field	*Validation Rule*
Date not before 1999	`>#12/31/98#`
Price zero or greater	`>=0`
Five characters beginning with P	`Like P????`
Ship date later than order date	`[Ship Date]>[Order Date]`

If a user attempts to enter data that does not pass a validation rule, the contents of the `Validation Text` field property pop up to guide the user, using the text you enter. Generally, the validation text guides the user to enter the right data. An exception may be if you don't want to give away too much information — maybe PO numbers are always two letters followed by three or more numbers, but you don't want users to guess at a PO number. Your validation text can simply say `Enter a valid PO number`.

TIP

The validation text cannot be longer than 255 characters.

Use operators to tell Access how to validate your data. *Operators* are symbols, (such as < and >) and words (such as `AND, OR,` and `NOT`) that tell Access how to limit your data. (Although `+`, `–`, `*`, and `/` are also operators, you aren't as likely to use them in validation rules.) You can also use expressions that include functions to create validation rules.

REMEMBER

The validation rule cannot be longer than 2,048 characters.

To create a validation rule, follow these steps:

1. **Display the table in Design view.**
2. **Select the field to which you want to add a validation rule.**

   Place the cursor anywhere in the row that displays the field and data type, or click the record selector to select the field. When the field is selected, or when the cursor is anywhere in its row, you see the field properties for that field.

   If you want to create a record validation rule, click the Properties button on the Design tab of the Ribbon.
3. **Click in the** `Validation Rule` **property.**
4. **Type your validation rule.**

   Table 5-3 tells you how to create your validation rule.
5. **Enter an explanatory message in the** `Validation Text` **property.**

   Validation text appears when data entered into the field does not meet the validation rule. In most cases, you want this script to be helpful for the user to understand why the input was not accepted. (In some cases, you may not want someone to make up data that passes the validation rule, so your validation text may be more cryptic.)

TIP

You can test data entered prior to the validation rule by one of two methods:

- right-clicking the title bar of the table and choosing the Test Validation Rules option from the shortcut menu
- displaying the datasheet by clicking the View button and clicking the Yes button when Access asks whether you want to test existing data

Table 5-3	Creating Validation Rules
Validation Rule Example	*How It Works*
`"Boston" OR "New York"`	Limits input in the field to just those two cities.
`Is Null`	Allows the user to leave the field blank.
`<10`	Allows values less than 10.
`>10`	Allows values greater than 10.
`<=10`	Allows values less than or equal to 10.
`>=10`	Allows values greater than or equal to 10.
`=10`	Allows values equal to 10.
`<>0`	Allows values not equal to 0.
`In("Boston", "Concord")`	Allows text that is *Boston* or *Concord*.
`Between 10 And 20`	Allows values between 10 and 20.

The `Like` operator deserves its own explanation. Use the `Like` operator to test whether an input matches a certain pattern — use wildcard characters, such as the ones shown in Table 5-4, to help define the pattern.

Table 5-4	Using the Like Operator
Wildcard	*What It Signifies*
`?`	Any single character
`#`	Any single number
`*`	Zero or more characters

For example, you may define a ZIP code field to only allow five digits, as follows:

```
Like "#####"
```

You can also define a field to contain only names that start with the letter `S`, as follows:

```
Like "S*"
```

According to the preceding rule, a person can choose not to type any characters after the `S`, because the `*` wildcard allows zero or more characters. If you always want a certain number of characters to follow the `S`, use the `?` wildcard instead. If you want users to type exactly three characters after the letter `S`, use this validation rule:

```
LIKE "S???"
```

You can use more than one expression in a validation rule by separating the expressions with AND, OR, or NOT. AND and NOT limit the entries that pass the rule. In the case of AND, an entry must pass both rules; in the case of NOT, an entry must pass one rule and fail the other. Using OR increases the likelihood that an entry passes the rule, because the entry only needs to pass one of the two rules separated by OR.

Chapter 6: Relating Your Tables and Protecting Your Data

In This Chapter

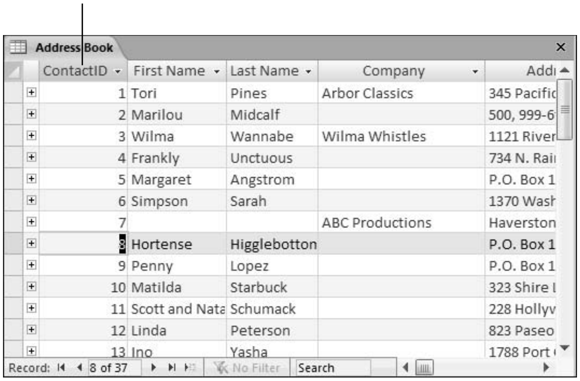
- **Creating relationships between tables**
- **Protecting your relationships with referential integrity**
- **Using cascading updates and deletes to protect data integrity**
- **Printing the relationships between tables**

Relational database-management systems such as Microsoft Access exist because the real world often requires that we store large amounts of data. And often, one-to-many or many-to-many relationships exist between pieces of data. For example, any one customer may place many orders (a one-to-many relationship). Any one order may be an order for many different products. In a school, any one student may enroll in many courses. Any one course has many students enrolled in it.

When information is spread across multiple tables, the data must always “link up” correctly. For example, if customer Hortense Higglebottom places an order on April 1st for five lawn flamingoes, the records from the various tables that record that information must jibe perfectly, so that she gets what she ordered, she pays the right amount for what she bought, and her five lawn flamingoes are sent to the correct address — and so she doesn’t end up getting 37 Golden Whistles instead. The technical term for making absolutely sure that all the pieces line up correctly, at all times, is *referential integrity*. But before we get to the specifics of how you enforce referential integrity in your database, we provide you with a brief review of all the buzzwords and concepts surrounding the whole idea of storing chunks of data in separate tables.

Book I, Chapter 4 describes relationships among tables from a design perspective.

When two tables are related in a one-to-many relationship, the table on the “one”side of the relationship must have a primary key field that uniquely identifies each record. For this reason, the table on the “one” side is often referred to as the *master table*. For the customers-and-orders example, the Address Book table is on the “one” side of the relationship, and the primary key field, `ContactID`, has a unique value for each record — that is, each customer listed in the table has a value in the `ContactID` field that is unique to him. If we want to refer to a customer anywhere else in the database, we can use that unique `ContactID` value as a shortcut. (See Figure 6-1.)



Contact ID field

Address Book

ContactID	First Name	Last Name	Company	Addı
1	Tori	Pines	Arbor Classics	345 Pacific
2	Marilou	Midcalf		500, 999-6
3	Wilma	Wannabe	Wilma Whistles	1121 River
4	Frankly	Unctuous		734 N. Rai
5	Margaret	Angstrom		P.O. Box 1
6	Simpson	Sarah		1370 Wash
7			ABC Productions	Haverston
8	Hortense	Higglebotton		P.O. Box 1
9	Penny	Lopez		P.O. Box 1
10	Matilda	Starbuck		323 Shire l
11	Scott and Nata	Schumack		228 Hollyv
12	Linda	Peterson		823 Paseo
13	Ino	Yasha		1788 Port

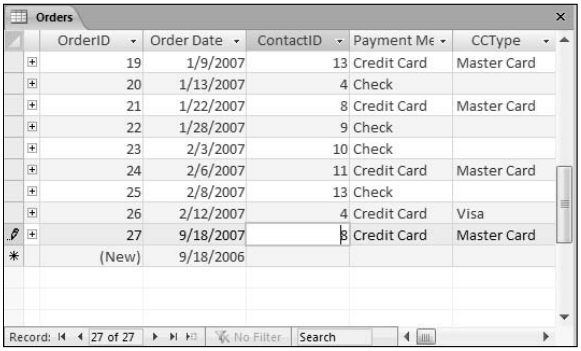
Figure 6-1: The Address Book table has the `ContactID` field as its primary key. The field value can be used to identify customers in other tables in the database.

The table on the "many' side of the relationship needs to contain a field that has (preferably) the same name, and (definitely) the same data type and field length as the primary key in the master table. In the table on the "many" side of the relationship, that field is referred to as the *foreign key*. Because that table contains the foreign key, it's often referred to as the *detail table*. In the customers-and-orders example, the Orders table is the detail table. Each order placed is listed in the Orders table, and the customer who placed the order is identified by his `ContactID` number. Taken together, the primary key and foreign key are often referred to as the *matching keys*. (There's a load of technical jargon for ya.)

You can see how the one-to-many relationship plays out when the two tables contain data. In Figure 6-2, looking up which orders are placed by Hortense Higglebottom is easy; the `ContactID` happens to be `8`.

In any given database, one-to-many relationships likely occur between several tables. A *many-to-many* relationship is just two one-to-many relationships among three tables, as we show in the Students-and-Courses example in Book I, Chapter 4. And in the orders example, there is a many-to-many relationship between products and customers. But you don't have to do anything special to define a many-to-many relationship. When you link two tables to a common third table, you create a many-to-many relationship.

Figure 6-3 shows relationships defined in an Access database. In the Relationships window, field names in boldface are primary keys. The connecting lines show how the tables relate. In that example, the number 1 on a connection line represents the master table — the table on the "one" side of the relationship. The many symbol (an infinity sign, or sideways 8) represents the detail table — the table on the "many" side.



Orders

	OrderID	Order Date	ContactID	Payment Me	CCType
⊞	19	1/9/2007	13	Credit Card	Master Card
⊞	20	1/13/2007	4	Check	
⊞	21	1/22/2007	8	Credit Card	Master Card
⊞	22	1/28/2007	9	Check	
⊞	23	2/3/2007	10	Check	
⊞	24	2/6/2007	11	Credit Card	Master Card
⊞	25	2/8/2007	13	Check	
⊞	26	2/12/2007	4	Credit Card	Visa
⊞	27	9/18/2007	8	Credit Card	Master Card
*	(New)	9/18/2006			

Record: 27 of 27 No Filter Search

Figure 6-2: The Orders table uses the `ContactID` field from the Address Book table to identify customers.

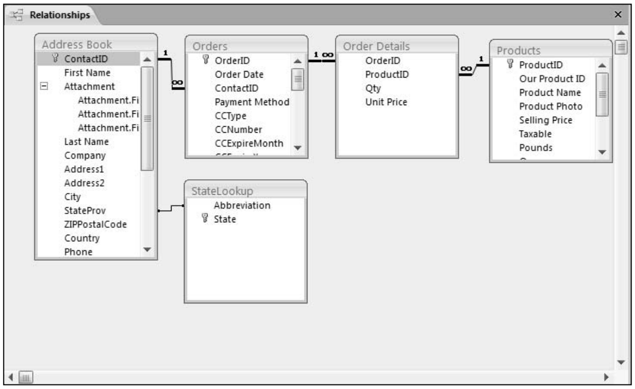


Figure 6-3: Multiple one-to-many relationships exist among the tables in this database.

Creating Relationships and Protecting Your Data with Referential Integrity

We're not referring to your personal relationships. (Well, maybe we are in an abstract sort of way.) Before you join two tables in the Relationships window, think about whether you want Access to enforce referential integrity between those tables. *Referential integrity*, as the name implies, is all about making sure that the relationship between two tables doesn't turn to total garbage.

To see how you convert a one-to-many relationship to garbage, consider the following scenario. Suppose a table named Products contains a primary key field named `ProductID` that uniquely identifies each record. Say a hammer in that Products table has a `ProductID` value of `232`.

The Order Details table in that same database *also* has a field named `ProductID`, which is the foreign key. Say 100 hammers are ordered to date, and 100 records in the Order Details table have the number `232` in their `ProductID` fields.

So now someone comes along and decides to change the hammer's `ProductID` code to `98765`. Or instead of changing the hammer's `ProductID`, that person just deletes that product from the Products table altogether. Either way, a record in the Products table no longer has a `ProductID` value of `232`.

So what becomes of the 100 records in the Order Details table that still have `232` in their `ProductID` fields? Do we leave them referring to the now nonexistent record `232`? If we do that, we destroy the referential integrity of the relationship between the tables. How, you may ask, did we manage to do that? Well, a bunch of records in the Order Details table now point to absolutely nothing — there's no way to tell what product the customer bought. The referential relationship between the Products and Order Details tables has lost its integrity.

Enforcing referential integrity prevents these bad things from happening. When you enforce referential integrity, you prevent yourself from accidentally messing up your relationships. (Well, okay, that doesn't apply to your personal relationships, even abstractly, but you get the point.)

Some rules exist to determine whether you can even choose to enforce referential integrity. You can only enforce referential integrity when all the following are true of the tables in the relationship:

- In the master table, the matching field must be a primary key, or a field with its `Indexed` property set to the `Yes (No Duplicates)` setting.
- In the detail table, the foreign key is of the same data type as the primary key. Or, if the primary key is an AutoNumber field, the foreign key is a Number field with its `Field Size` property set to the `Long` width.
- Both tables are stored in the same Access database.

Deciding on the best path to take

Assuming all the rules for enforcing referential integrity are met — see the previous section for a refresher — you're ready to get started. Just keep in mind that you have a choice between two distinct types of referential integrity you can enforce:

- **Cascade Update Related Fields:** This option ensures that if the value of the primary key field changes in the master table, the same change "cascades" to all records in the detail table. (This option doesn't apply if the primary key is an AutoNumber field. ***Remember:*** After an AutoNumber field receives a value, that value never changes.)

- ✦ **Cascade Delete Related Records:** This option ensures that if a record is deleted in the master table, all corresponding records in the detail table are also deleted.

You can choose to enable referential integrity as soon as you join two tables in the Relationships window — more about said window later. You can change or disable referential integrity options at any time, so you're not making a lifelong commitment or anything.

Opening the Relationships window

The place where you actually join tables and enforce referential integrity between them is called the Relationships window, the same window you see back in Figure 6-3. Clearly then, if you want to be able to set up referential integrity between two tables, you're going to need some hints on how to open the Relationships window. What the heck — how about some explicit instructions, such as the following . . . ?

1. **If any tables are open, close them.**

   Access can't create a relationship if one of the tables involved is open.

2. **Click the Relationships button on the Database Tools or Datasheet tab of the Access Ribbon.**

The Relationships window may be empty when you first open it, but if we know you, it won't be that way for long; you can (and probably will) add tables to the window at any time, as the next section makes clear. It's possible that some relationships may have already been created, too, even if you don't remember creating them. There are ways to define relationships that don't use the Relationships window, such as using the Lookup Wizard.

Adding tables to the Relationships window

After the Relationships window is open, you can add tables to it by performing the following steps:

1. **Click the Show Table button on the Design tab of the Ribbon.**

   The Show Table dialog box appears.

2. **Click the name of any table you want to add to the Relationships window, and then click the Add button.**

   Repeat Step 2 as many times as you wish to add multiple tables to the Relationships window. You can select multiple tables by holding down the Ctrl key as you select table names.

3. **Click the Close button in the Show Table dialog box.**

The Show Table dialog box closes and — voilà — the tables you chose are visible in the Relationships window. Not the entire table, of course. That would be too big. Only a *field list* that shows the names of all the fields in the table displays for each table you select. You can move those field lists around by dragging their title bars. You can size them by dragging any corner or edge.

Setting referential integrity between two tables

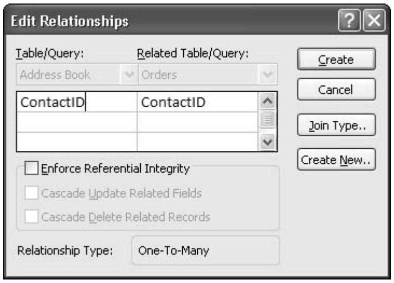
When you have two or more tables in the Relationships window, you can define their relationship and referential integrity. Here's how:

1. **Click the matching key in either table to select that field name.**

   For example, if you're joining the Address Book and Orders tables shown in Figure 6-3, you click the `ContactID` field in either table.

2. **Drag that selected field name to the corresponding field name in the other table, and drop it there.**

   The Edit Relationships dialog box, shown in Figure 6-4, opens.



Edit Relationships

Table/Query: Address Book

Related Table/Query: Orders

Table/Query	Related Table/Query
ContactID	ContactID

☐ Enforce Referential Integrity

☐ Cascade Update Related Fields

☐ Cascade Delete Related Records

Relationship Type: One-To-Many

Figure 6-4: The Edit Relationships dialog box.

3. **If you want to turn on referential integrity, select the Enforce Referential Integrity check box.**

   The Cascading options (beneath the Enforce Referential Integrity check box) are now enabled.

4. **If you want matching records in the detail table to update automatically when the value of a primary key field changes, select the Cascade Update Related Fields check box.**

5. **If you want matching records from the detail table deleted automatically after you delete a record in the master table, select the Cascade Delete Related Records check box.**

6. **Click the Create or OK button to save your changes and close the Edit Relationships dialog box.**

   (The OK button replaces the Create button when you edit an existing relationship as opposed to creating a new one.)

If you join two tables without enforcing referential integrity, the connecting line (or the *join* line) in the Relationships window is just a thin black line, as shown in the top two tables in Figure 6-5. If you enforce referential integrity, the connecting line displays a 1 near the master table, and a “many” symbol (an infinity sign, or sideways 8) near the detail table, as shown in the bottom two tables in Figure 6-5.

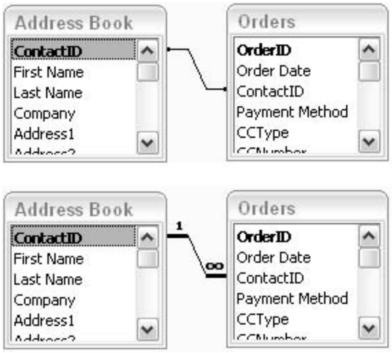


Figure 6-5: Joined tables without (top) and with (bottom) referential integrity enforced.

The relationship you define is not etched in stone. You can change the relationship between two tables at any time.

Editing and deleting relationships

To change or delete the relationship between two tables in the Relationships window, you first need to select the relationship you want to change. Selecting a relationship is trickier than you think. Follow these steps to select the join line that represents the relationship you want to change:

1. **In the Relationships window, right-click the join line that you want to change or delete.**

   You see the options shown in Figure 6-6. If you see different options, you right-clicked too close to a table. Clicking right on the line can be tricky: Try right-clicking nearer to the center of the join line you want to change.

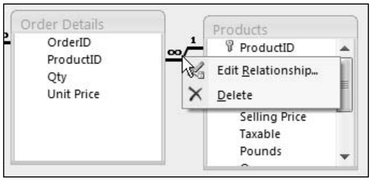


Figure 6-6: Right-click a connecting line to delete or change it.

2. Choose from the following:

- If you want to delete the line (which deletes the relationship and turns off referential integrity), choose the Delete option.
- If you want to change something about the relationship, choose the Edit Relationship option.

If you choose the Edit Relationship option, the Edit Relationships dialog box opens, where you can change or disable referential integrity. Make your changes and then choose OK.

The Join Type button in the Edit Relationships window allows you to set a default join type to be used in queries. Join types have no bearing on referential integrity. See Book III, Chapter 1 for more on Join Types.

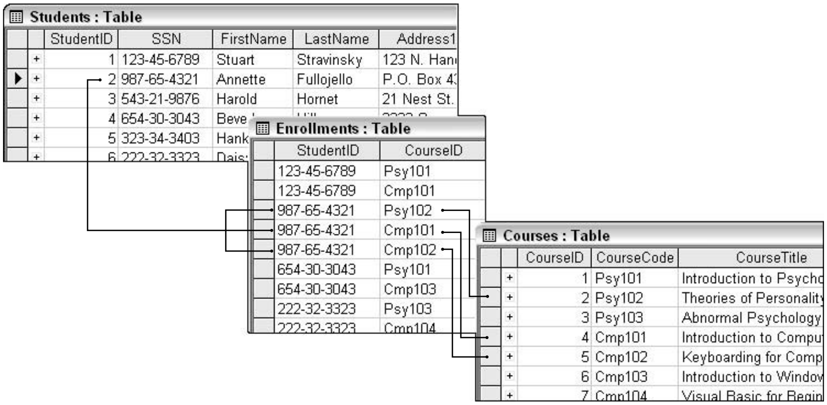
Referential Integrity with Many-to-Many Relationships

As we discuss in Book I, Chapter 4, a many-to-many relationship often exists among chunks of data. For example, a school has many students, enrolled in many different courses. To design a database that contains information about students, courses, and enrollment, you need three tables. One table, perhaps named Students, contains a record for each student with a primary key field named `StudentID` that uniquely identifies each student.

A second table, perhaps named Courses, contains one record for each course with a primary key named `CourseID` that uniquely identifies each course. To keep track of which students are enrolled in which courses, you need a third table (called a *junction table*) that contains a record that pairs a `StudentID` with a `CourseID`. For the sake of the example, say the junction table is named Enrollments, as in Figure 6-7. When looking at data in the tables, you see how each record in the Enrollments table links a student to his or her courses.

The same tables, and same relationships, link any given course to the students that are enrolled in it, as shown in Figure 6-8.

While a many-to-many relationship is conceptually its own beast, Access only recognizes one-to-many relationships. To set up referential integrity among the tables, you don’t create a “special” many-to-many join. Rather, you just connect the fields and enforce referential integrity on each join line, as shown in Figure 6-9.



Students : Table

		StudentID	SSN	FirstName	LastName	Address1
	+	1	123-45-6789	Stuart	Stravinsky	123 N. Han
▶	+	2	987-65-4321	Annette	Fullojello	P.O. Box 4
	+	3	543-21-9876	Harold	Hornet	21 Nest St.
	+	4	654-30-3043	Beve		
	+	5	323-34-3403	Hank		
	+	6	222-32-3323	Dais		

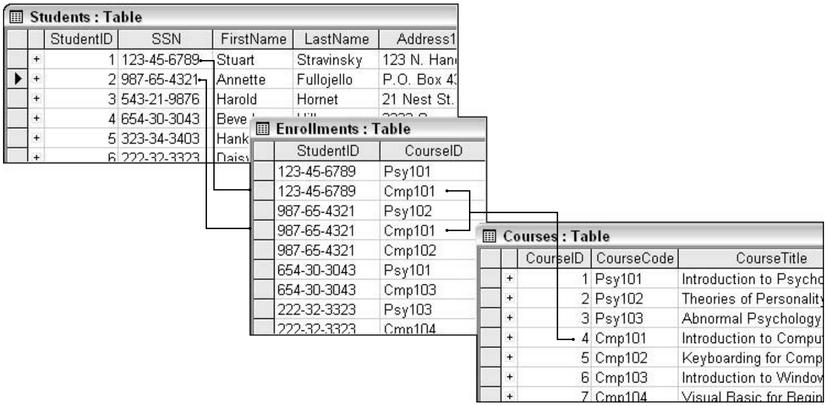
Enrollments : Table

	StudentID	CourseID
	123-45-6789	Psy101
	123-45-6789	Cmp101
	987-65-4321	Psy102
	987-65-4321	Cmp101
	987-65-4321	Cmp102
	654-30-3043	Psy101
	654-30-3043	Cmp103
	222-32-3323	Psy103
	222-32-3323	Cmp104

Courses : Table

		CourseID	CourseCode	CourseTitle
	+	1	Psy101	Introduction to Psycho
	+	2	Psy102	Theories of Personality
	+	3	Psy103	Abnormal Psychology
	+	4	Cmp101	Introduction to Compu
	+	5	Cmp102	Keyboarding for Comp
	+	6	Cmp103	Introduction to Windov
	+	7	Cmp104	Visual Basic for Begin

Figure 6-7: Any one student can be enrolled in many courses.



Students : Table

		StudentID	SSN	FirstName	LastName	Address1
	+	1	123-45-6789	Stuart	Stravinsky	123 N. Han
▶	+	2	987-65-4321	Annette	Fullojello	P.O. Box 4
	+	3	543-21-9876	Harold	Hornet	21 Nest St.
	+	4	654-30-3043	Beve		
	+	5	323-34-3403	Hank		
	+	6	222-32-3323	Daisy		

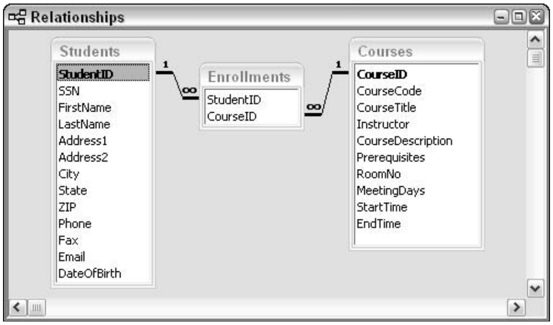
Enrollments : Table

	StudentID	CourseID
	123-45-6789	Psy101
	123-45-6789	Cmp101
	987-65-4321	Psy102
	987-65-4321	Cmp101
	987-65-4321	Cmp102
	654-30-3043	Psy101
	654-30-3043	Cmp103
	222-32-3323	Psy103
	222-32-3323	Cmp104

Courses : Table

		CourseID	CourseCode	CourseTitle
	+	1	Psy101	Introduction to Psycho
	+	2	Psy102	Theories of Personality
	+	3	Psy103	Abnormal Psychology
	+	4	Cmp101	Introduction to Compu
	+	5	Cmp102	Keyboarding for Comp
	+	6	Cmp103	Introduction to Windov
	+	7	Cmp104	Visual Basic for Begin

Figure 6-8: Any one course contains many students.



Relationships

Students
- StudentID
- SSN
- FirstName
- LastName
- Address1
- Address2
- City
- State
- ZIP
- Phone
- Fax
- Email
- DateOfBirth

Enrollments
- StudentID
- CourseID

Courses
- CourseID
- CourseCode
- CourseTitle
- Instructor
- CourseDescription
- Prerequisites
- RoomNo
- MeetingDays
- StartTime
- EndTime

Figure 6-9: The relationships among the Students, Courses, and Enrollments tables are set to enforce referential integrity, as indicated by the 1 and infinity symbols.

Printing the Relationships Window

You can print a copy of your Relationships window at any time. Doing so is not necessary. But if you'd like to have a printed copy to refer to in the future, you can just follow these steps:

1. **First make sure the Relationships window is open, and looks just the way you want the printed copy to look.**
2. **Click Relationship Report on the Design tab.**

   The printer won't start churning right away. Instead, a preview of what the printer will print appears in a new window.

3. **Click the Print button on the Ribbon.**

   Now the printer actually prints the relationships.

4. **Click the Close Print Preview button on the Print Preview tab.**

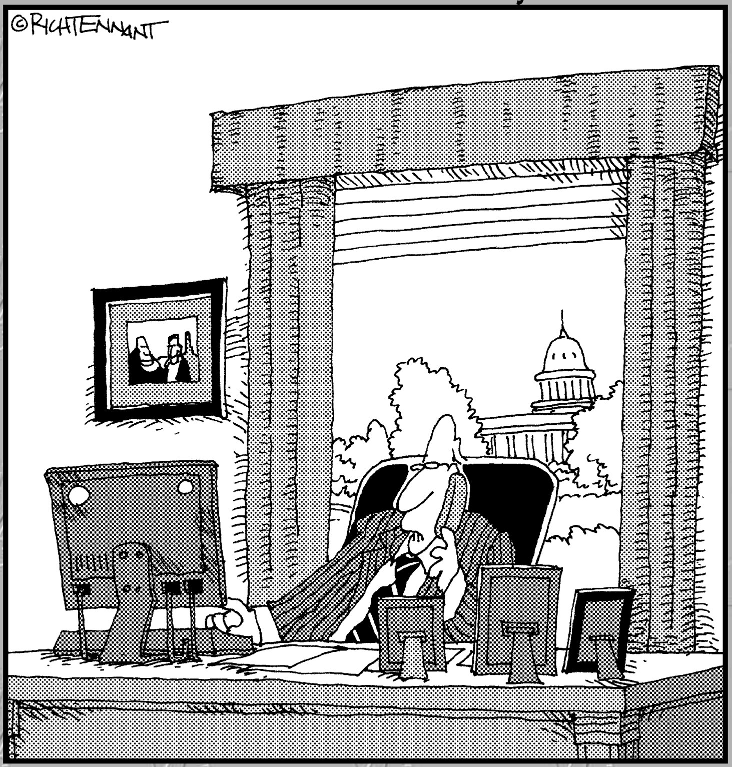
   A Report Design screen suddenly opens, but don't be alarmed. It appears in case you want to save a copy of the Relationships window as an Access Report. If you haven't gotten into reports yet, and don't know what that means, don't worry about it. You can just continue with the next step.
5. **Click the Close (X) button in the upper-right corner of the Report Design window, and then click the No button when asked whether you want to save the changes made to the Report.**

   You return to your Relationships window. To close the Relationships window, click the Close (red X) button in its upper-right corner.

As we said, you don't need to concern yourself with this business of reports right now, so don't worry about the weird stuff that happens when you print your Relationships window. But just so you know, Access Reports are covered in Book V.

Book III

Queries



The 5th Wave By Rich Tennant

"Yes, I know how to query information from the program, but what if I just want to leak it instead?"

Contents at a Glance

Chapter 1: Creating Select Queries

In This Chapter

- **What do queries do — and what kind of queries can you make?**
- **Creating a select query with a wizard**
- **Creating and editing a select query in Design view**
- **Getting the data you want out of your queries with criteria and sorting**
- **Using query datasheets to enter and edit data**
- **Saving your queries**

Queries are a way to ask questions of your data. Do you want to know who ordered a lawn flamingo? Which customers live in California? Which orders contain items that have been discontinued? What your top ten bestselling items are? Queries can tell you all that and more.

Like the tables covered in Book II, queries have two views: Design view and Datasheet view. In Design view, you define your query — you tell Access which fields you want to see, which tables they come from, and the criteria that any record has to meet in order to appear on the resulting datasheet. In Datasheet view, you see the fields and records Access finds that meet your criteria.

You can use queries to do the following:

- Look at data from related tables
- Look at subsets of your data — a selective slice that meets certain criteria that you specify
- Sort and alphabetize data
- Create new calculated fields

You can make as many queries as you want to — usually some are made on the fly and not saved, and some are saved — even used as the basis for forms and reports.

To create a query, you need to know what data — more specifically, which fields — you want to see and which tables those fields are in. As you define the query, you may have criteria that limit the data. After you define the query, you can view the data in a datasheet. The datasheet created by a query is dynamic — that is, you see the data that meets the query definition each time you view the datasheet. If data has been added, edited, or deleted, the query datasheet may display different data.

To create a query, you use either a wizard or Design view (or both) to tell Access which data you want to see. The easiest way for a beginner to create a query is to use the Simple Query Wizard, but after you understand queries, you may prefer to go right to Design view.

We start this chapter by telling you about the different types of queries that Access offers, and then introduce you to Design view. This chapter concentrates on select queries, which are the most common type of query, and the skills you use to create select queries. Then we guide you through creating a query using the Simple Query Wizard. But because the Simple Query Wizard doesn't allow you to define criteria (such as limiting records to those ordered this month, or only viewing products that cost more than $20), you probably want to move quickly to the next sections on using Design view and criteria. At the end of the chapter, you find all the details on working with your query data in a datasheet.

Types of Queries

The many different types of queries that Access provides give you many different ways to select and view specific data in your database. You choose the type of query, choose fields you want to see, and define criteria to limit the data shown as necessary.

The following list includes the types of queries available in Access:

- **Advanced Filter/Sort:** The simplest kind of query, Advanced Filter/Sort allows you to find and sort information from a single table in the database. This option is available from any datasheet by clicking Advanced in the Sort & Filter group of the Home tab on the Ribbon and choosing Advanced Filter/Sort.
- **Select Query:** A select query selects the data you want from one or more tables and displays the data in the order in which you want it displayed. A select query can include criteria that tell Access to filter records and display only some of them. Select queries that display individual records are called detail queries; those that summarize records are called Summary or Totals queries.

- **Totals or Summary Query:** These queries are a subset of select queries, but they allow you to calculate a sum or some other aggregate (such as an average) rather than displaying each individual record. (Totals queries are covered in Chapter 2 of this minibook.)
- **Parameter Query:** A query that asks you for one or more pieces of information before displaying the datasheet.
- **AutoLookup Query:** A query that fills in information for you. (AutoLookup queries are covered later in this chapter.)
- **Action Query:** Action queries change your data based on some set of criteria. Action queries can delete records, update data, append data from one or more tables to another table, and make a new table. (We describe action queries in Chapter 3 of this minibook.)
- **Crosstab Query:** Most tables in Access, including ones generated by queries, have records down the side and field names across the top. Crosstab queries produce tables with the values from one field down the side and values from another field across the top of the table. A crosstab query performs a calculation — it sums, averages, or counts data that is categorized in two ways, as defined by the row and column labels. (Crosstab queries are covered in Chapter 4 of this minibook.)

Select queries are the most common type of queries used in Access. In fact, select queries are the most general type of query, and all the other query types add features to select queries. When you define a select query, you use the design grid to select which fields and records to display in the new datasheet. The skills you use to define select queries are also used to define the other types of queries.

Creating a Query in Design View

If you're completely new to queries, this section is for you. Here we create a simple select query so you can see what, exactly, a query does.

Just follow these steps to create a simple query:

1. **Display the Create tab on the Ribbon.**
2. **Click the Query Design button in the Other group.**

   Access displays Design view and the Show Table dialog box, shown in Figure 1-1.

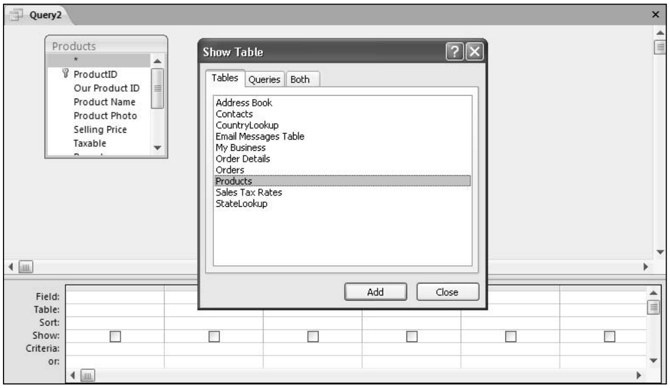


Figure 1-1: Start your query by selecting the table that has the data you need.

3. **In the Show Table dialog box, select the table that contains the fields you want to display in the query datasheet, and then click the dialog box's Add button.**
4. **Click the Close button in the Show Table dialog box.**

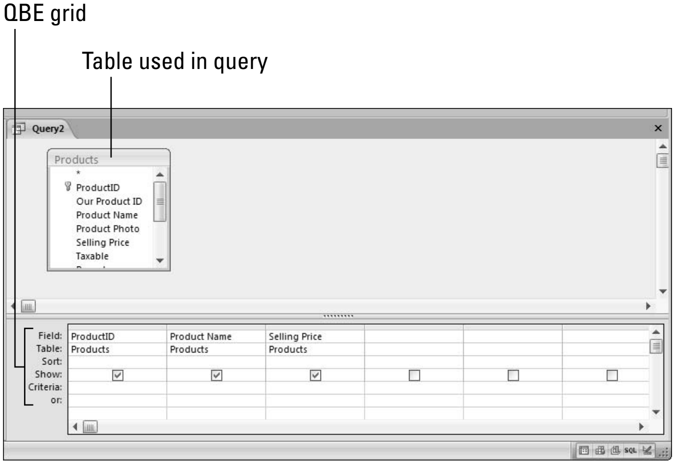
   Now Design view displays the table you selected in its top pane and the empty design grid in its bottom pane.

   You can close the Query Property sheet — you don't need it right now. Redisplay it at any time by clicking Property Sheet in the Show/Hide group of the Design tab on the Ribbon.
5. **Double-click a field name in the top pane to display that field name in the bottom pane — the design grid. Repeat to include any additional fields.**

   You can drag a field name to the design grid or double-click a field name to move it to the grid. You can also use the drop-down Field and Table lists in the design grid to select the fields that you want to use. To select multiple field names in the Field list, use the standard Ctrl+click or Shift+click selection techniques, and then drag all selected field names to the design grid.

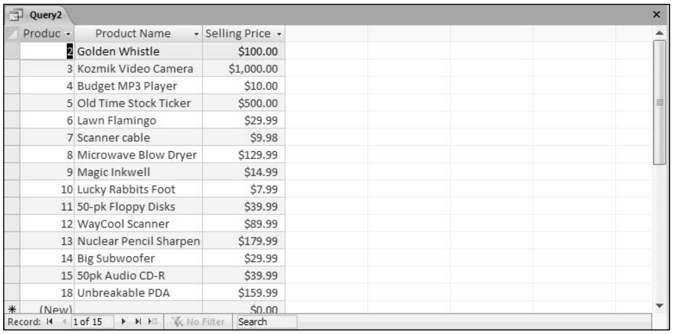
   Figure 1-2 shows the query we created. Here we are asking to view three fields from the Products table — the `ProductID`, `Product Name`, and `Selling Price` fields.
6. **Click the View button to see the datasheet with the data selected by your query.**

   Our datasheet, shown in Figure 1-3, shows the three fields we put in the design grid.



Field:	ProductID	Product Name	Selling Price			
Table:	Products	Products	Products			
Sort:						
Show:	☑	☑	☑	□	□	□
Criteria:						
or:						

Figure 1-2: This simple query asks to see three fields from the Products table.



Produc	Product Name	Selling Price
2	Golden Whistle	$100.00
3	Kozmik Video Camera	$1,000.00
4	Budget MP3 Player	$10.00
5	Old Time Stock Ticker	$500.00
6	Lawn Flamingo	$29.99
7	Scanner cable	$9.98
8	Microwave Blow Dryer	$129.99
9	Magic Inkwell	$14.99
10	Lucky Rabbits Foot	$7.99
11	50-pk Floppy Disks	$39.99
12	WayCool Scanner	$89.99
13	Nuclear Pencil Sharpen	$179.99
14	Big Subwoofer	$29.99
15	50pk Audio CD-R	$39.99
18	Unbreakable PDA	$159.99
(New)		$0.00

Figure 1-3: The datasheet shows the data we asked for.

If you want to save the query, click the Save button on the toolbar. Give the query a name that indicates the data it selects. Remember that the next time you open the query in Datasheet view, you see updated data — if any records have been added, deleted, or modified, the query reflects that. You may choose not to save the query, if you won't need it again. Just close it and click the No button when Access asks whether you want to save it.

Now that you have the hang of what a query is, you're probably ready for more — getting summary data out of a query, sorting the results, limiting results with criteria, and so on. Read on!

Creating a Query with the Simple Query Wizard

The Simple Query Wizard does a great deal of the work of creating a query for you. It's most useful when you want to use fields from different tables and when you want a query that summarizes your data.

The Simple Query Wizard gives you the option of creating either a summary (totals) query or a detail query. A *detail query* lists every record that meets your criteria. A *summary query* (also called a totals query) performs calculations on your data to summarize it. You can create a summary query if the fields you choose for the query include both of the following:

- A field with values
- A field with repetitions or a field with dates, used to group the values

A summary query gives you the option of totaling (summing), averaging, counting the number of values in a field, or finding the minimum or maximum value in a field. A summary query creates new calculated fields that you can use in other queries or in reports.

Need an example? Here's one. If you have a field that lists the amount spent and a field that lists the dates on which the money was spent, the Simple Query Wizard creates a summary query for you that sums the amount spent by date. Pretty neat, huh?

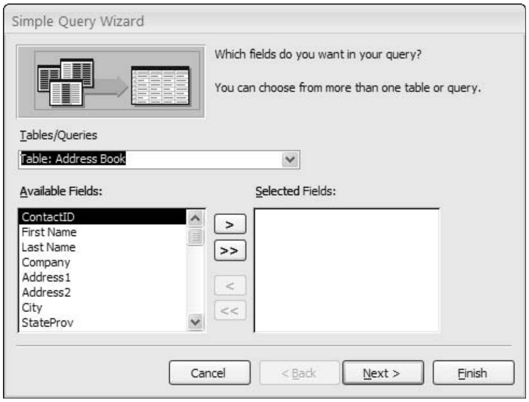
Ready to give the Simple Query Wizard a spin? Just follow these steps to use the wizard to create a query:

1. **Display the Create tab on the Ribbon and click the Query Wizard button.**
2. **Select Simple Query Wizard from the New Query dialog box and click OK.**

   Access displays the first window of the Simple Query Wizard, as shown in Figure 1-4.
3. **Use the Tables/Queries list box to choose the first table or query that you want to use fields from.**

   Many queries are based on tables, but you also have the option of basing a query on another query. For instance, maybe you already created a query to select sales data from only the year 2003. Now, without modifying the original query, you want to create a query that lists 2003 sales by state, or limits the analysis to just a few salespeople.

   When you select a table or query, fields from that object appear in the Available Fields list box.



Which fields do you want in your query?

You can choose from more than one table or query.

Tables/Queries: Table: Address Book

Available Fields:

- ContactID
- First Name
- Last Name
- Company
- Address1
- Address2
- City
- StateProv

Selected Fields:

Figure 1-4: Choose fields for the query — they can come from more than one table.

4. **Move the fields you want to use in the query from the Available Fields list to the Selected Fields list by double-clicking a field name (or by selecting the field name and then clicking the > button).**

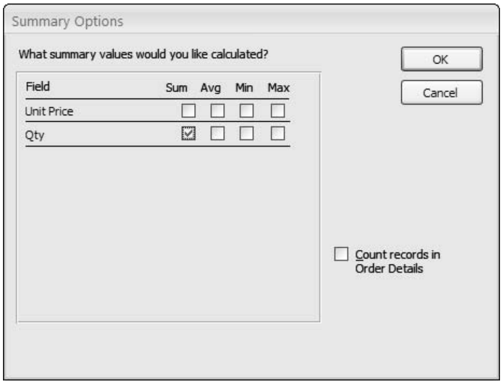
5. **If you're using fields from more than one table or query, repeat Steps 2 and 3 to add fields from the additional tables or queries to the Selected Fields list and then click Next.**

From this point on, the windows you see depend upon the types of fields and the type of query (detail or summary) you choose.

6. **Choose the type of query you want: Detail or Summary. Depending on your selection, do one of the following:**

- If you choose a summary query, click the Summary Options button.
- If you choose a detail query, click Next and jump to Step 9.

The Summary Options window displays, shown in Figure 1-5, where you tell the wizard how to summarize each field.



What summary values would you like calculated?

Field	Sum	Avg	Min	Max
Unit Price	□	□	□	□
Qty	☑	□	□	□

□ Count records in Order Details

Figure 1-5: Choose how to summarize your data using these options.

7. **Choose how to summarize your data and click OK to close the Summary Options dialog box. Then click Next to see the next window of the wizard.**

   Use the check boxes to indicate the new fields you want Access to create. For example, if you want to add all the values in the `Qty` field (to calculate how many of each item have been sold), click the Sum check box in the row for the `Qty` field.

   Don't overlook the Count check box(es) that may appear in this window — selecting a Count check box tells the wizard to create a field that counts the records within each grouping.

8. **If the fields being summarized can be grouped by a Time/Date field, choose the time interval the records should be grouped by and click Next.**

   You will not see this window if your data does not contain a Time/Date field.

   For example, if you choose to include the Order Date field in the query and to sum the Qty field, you can group by month to see how many of each item you sold in each month. You can choose to display total check amounts by the following options: Day, Month, Quarter, or Year. The Unique Day/Time option groups records by each unique date and time; if your data includes times, each record with the same date and time is grouped together. If your data only includes a date without the time, each record from the same day is grouped together (which is the same as the Day option).

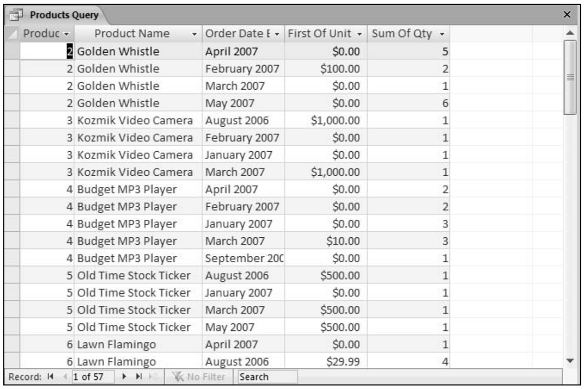
9. **Type a name for the query in the box at the top of the window.**

   Choose from these options:

   - **Open the Query to View Information:** This option shows you the query in Datasheet view.
   - **Modify the Query Design:** This option shows you the query in Design view.
   - **Display Help on Working With the Query**: Click this check box if you want to see the help screen that covers working with a query.

10. **Click Finish to view the query.**

    If you chose the Open the Query to View Information option, you see the query in Datasheet view. If you chose the Modify the Query Design option, you see your resulting query datasheet, looking something like what you see in Figure 1-6.



Produc	Product Name	Order Date E	First Of Unit	Sum Of Qty
2	Golden Whistle	April 2007	$0.00	5
2	Golden Whistle	February 2007	$100.00	2
2	Golden Whistle	March 2007	$0.00	1
2	Golden Whistle	May 2007	$0.00	6
3	Kozmik Video Camera	August 2006	$1,000.00	1
3	Kozmik Video Camera	February 2007	$0.00	1
3	Kozmik Video Camera	January 2007	$0.00	1
3	Kozmik Video Camera	March 2007	$1,000.00	1
4	Budget MP3 Player	April 2007	$0.00	2
4	Budget MP3 Player	February 2007	$0.00	2
4	Budget MP3 Player	January 2007	$0.00	3
4	Budget MP3 Player	March 2007	$10.00	3
4	Budget MP3 Player	September 200	$0.00	1
5	Old Time Stock Ticker	August 2006	$500.00	1
5	Old Time Stock Ticker	January 2007	$0.00	1
5	Old Time Stock Ticker	March 2007	$500.00	1
5	Old Time Stock Ticker	May 2007	$500.00	1
6	Lawn Flamingo	April 2007	$0.00	1
6	Lawn Flamingo	August 2006	$29.99	4

Figure 1-6: The datasheet shows data summarized by product and date.

You can edit the query created by the Simple Query Wizard using Design view, (about which there's lots more in the rest of this chapter).

TIP

The Simple Query Wizard doesn't allow you to include criteria to choose which records you want to include in the query datasheet. If you want to include criteria in your query, open the query created by the wizard in Design view and add the criteria. (Details of Design view appear throughout this chapter.)

Viewing Your Query

After you create a query, you can open it in any of these views:

- **Design view** displays the Design view where you can select tables, fields, create criteria, expressions, define sort order, and all the other things you need to do to define a query.
- **Datasheet view** displays the fields from the query in a datasheet, just as if you were looking at a table datasheet.
- **SQL view** displays the query definition as a statement in SQL (*Structured Query Language*).
- **PivotTable** and **PivotChart views** summarize and chart the data from the query. (See Chapter 4 of this minibook for how to create PivotTables, and Book V, Chapter 3 for how to create PivotCharts.)

When you open a query, you can open it in Datasheet or Design view by selecting the query name in the Database window and clicking the Open button (for Datasheet view) or the Design button (for Design view).

When a query is already open, you can switch between Design and Datasheet views by clicking the View button (the left-most button on the toolbar). To display SQL PivotTable or PivotChart view, click the downward-pointing triangle at the right side of the View button. Choose the view you want.

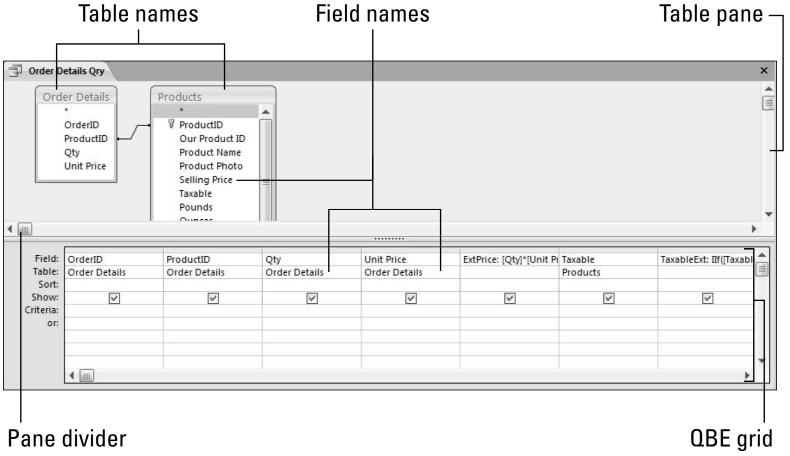
Understanding Design View

If you're reading the chapter from the beginning, you created a simple, one-table query, and you used the Simple Query Wizard to create another query. Queries can do so much more, though, so dive into Design view and figure out what's what.

Design view

Design view is where you tell Access about the data you're looking for. In Design view you specify the tables (or other queries) where Access finds the data you want, the fields from those tables that you want to see, and any criteria that the data must pass in order to appear in the datasheet. You also use Design view to choose the type of query, specify calculations, and define the sort order of the resulting data.

Here are our two favorite ways to display a query in Design view (shown in Figure 1-7):



Field:	OrderID	ProductID	Qty	Unit Price	ExtPrice: [Qty]*[Unit Pı	Taxable	TaxableExt: IIf([Taxabl
Table:	Order Details	Order Details	Order Details	Order Details		Products	
Sort:							
Show:	☑	☑	☑	☑	☑	☑	☑
Criteria:							
or:							

Figure 1-7: A query displayed in Design view.

- ✦ Click Queries in the Navigation Pane, right-click the query name, and select Design View.
- ✦ Click the View button when the query is displayed in Datasheet view.

Table 1-1 explains what the most useful buttons on the query's Design tab on the Ribbon do.

Table 1-1 Buttons in Design View

Toolbar Button	*Button Name*	*What It Does*
☒ Close Print Preview	View	Displays Datasheet view — the data set defined by the query.
💾	Save	Saves the query design.
Query Type	Query Type group	Choose a query type: Select Query, Crosstab Query, Make-Table Query, Update Query, Append Query, or Delete Query.
! Run	Run	Runs the query. (For a select query, clicking the Run button does the same thing as clicking the View button. When the query is an action query, the Run button performs the action. Use this button carefully.)
Show Table	Show Table	Displays the Show Table dialog box so that you can add tables to the query.
Σ Totals	Totals	Displays the Totals row in the design grid. (Use the Totals row to create calculations that summarize your data.)
Return: All	Top Values	Limits the result of the query displayed in the datasheet to the number of records or the percentage of records displayed in this option (for example, All, 5, 25%, and so on). You can choose from the drop-down list or type values into this option.
Property Sheet	Property Sheet	Displays properties for the selected field or Field list.
Builder	Builder	Displays the Expression Builder dialog box. (This button can only be clicked when the cursor is in the Field or Criteria row.) See more about building expressions in Chapter 3 of this minibook.

TIP

You can change the size of the panes in Design view by dragging the pane divider. Just move the mouse pointer to the divider, where it changes shape; then click, hold, and drag to move the divider.

Working with tables in Design view

The tables in the Table pane (the top pane of the Design View window) are really just little Field lists that you can move and size in the same way that you move and size windows. Change the size of a table window by moving the mouse pointer to the border of the window where it turns into a double-headed arrow; then drag the border to change the size of the window. To move a table in the Table pane, drag its title bar. This technique may come in handy when you work with related tables and want a clear look at the relationships between them.

If your query contains tables that have existing relationships that were previously defined with lookup fields (or created in the Relationships window), you see those relationships as lines between the related tables. (You can see more about relationships in Book II, Chapter 6.)

Introducing the query design grid

The bottom pane of Design view is technically called the Query by Example (QBE) grid, but is often simply called the design grid. It is your handy visual aid for defining the data you want to select with your query. Each row in the design grid has a specific purpose. Table 1-2 lists how to use each of them.

Table 1-2 Rows in the Query Design Grid

Design Grid Row	*What It Does*
Field	Displays the name of a field that you want to include in a query.
Table	Displays the name of the table that the field comes from. (This row is not always visible.)
Total	Performs calculations in your query. (This row is not always visible — use the Totals button on the Design tab on the Ribbon to display or hide it.)
Sort	Determines the sort order of the datasheet produced by the query.
Show	Shows or hides a field. (If you want to use a field to determine which records to display on the datasheet, but not actually display the field, remove the check mark from the Show column for the field.)
Criteria	Tells Access the criteria — such as records with values less than 10, or records with dates after 12/3/2005 — for the field in the same column.
Or	Use for additional criteria.

Each of these query features gets more detailed coverage later in this chapter.

Navigating Design view

You can work in Design view by using the mouse (to click the pane that you want) as well as the scroll bars (to see parts of the view that don't fit onscreen). Or, if you prefer, you can use the keyboard to move around.

The keys in Table 1-3 move you around Design view.

Table 1-3 Shortcut Keys in Design View

Key	*What It Does in the Table Pane*	*What It Does in the Design Grid*
Tab	Moves to the next table	Moves to the next row to the right.
Shift+Tab	Moves to the previous table	Moves to the next row to the left.
Alt+↓ or F4	Nothing	Displays the drop-down list (if the row has one).
Page Down	Displays more field names in the active table	Displays more OR criteria.
Home	Moves to the top of field names	Moves to the first column in the grid.

Displaying or hiding table names

You can view table names for each field in the query design in the Table row, or you can choose not to see the Table row.

To make the Table row appear or disappear, use one of these methods:

- Right-click the design grid and choose the Table Names option from the shortcut menu.
- Click the Table Names button in the Show/Hide group of the Design tab on the Ribbon.

Tips for Creating a Query

The "Creating a Query in Design View" section (earlier in this chapter) includes the basics for creating a query in Design view, but you can do so much more. This section delves into a few more aspects of the Creating Queries story.

Adding tables to the query

In order to use a table's fields in a query, you have to display the table name in the top pane of the Design view.

To do that, you need to view all table names by opening the Show Table dialog box. Open the Show Table dialog box, using whichever of the following methods seems most convenient at the moment:

- Right-click the Table pane of Design view and choose the Show Table option from the shortcut menu.
- Click the Show Table button in the Query Setup group of the Design tab on the Ribbon.

After the Show Table dialog box opens, add a table to the query by using whichever of the following methods is most convenient:

- Double-click the table name in the Show Table dialog box.
- Select the table and then click the Add button.

When you add all the tables that you need, click the Close button in the Show Table dialog box to get back to work in Design view.

To remove a table from a query, all you need do is press the Delete key on your keyboard when the table in the Table pane is selected (that is, when any field in the table is highlighted). When a table is deleted from Design view, all the fields in the design grid from that table are deleted too. Because deleting a table from a query is so absurdly easy — and can have damaging consequences for your query — take care when your fingers get close to the Delete key.

If you want to include a field generated by another query, you can add queries to a query by clicking either the Queries tab or the Both tab of the Show Table dialog box, and then double-clicking the query name.

Inserting fields in a design grid

You can move a single field from the Table pane to the design grid in three easy ways:

- **Double-click the field name.** Access moves the field to the first open column in the grid.
- **Drag the field name from the Table pane to the Field row of an unused column in the design grid.** This option is popular among dragging fans, or when you want to put a field in a specific location in the grid
- **Use the drop-down list in the Field row of the design grid to choose the field you want.** If you use this method with a multiple-table query, you may find choosing the table name from the drop-down Table list before selecting the field name easier. If you don't have the Table row in your design grid, see the "Displaying or hiding table names" section, earlier in this chapter.

You can place all the field names from one table into the design grid in two ways:

- **Put one field name in each column of the grid:** If you have criteria for all the fields, you can put one field name in each column of the design grid in just two steps. Double-click the table name in the Table pane of Design view to select all the fields in the table. Then drag the selected names to the design grid. When you release the mouse button, Access puts one name in each column.
- **Put all the field names in one column:** This method is useful if you want to find something that could be in any field, or if you have one criterion for all the fields in the table. To tell Access to include all field names in one column, drag the asterisk (above the first field name in each table window) to the grid. The asterisk is also available as the first choice in the drop-down Field list in the design grid — it appears as `TableName.*`.

Editing a Query

If you want, you can do some major reconstruction to your query in the design grid — you can move the columns around, delete a column, or delete all the entries in the grid.

To do any of those things, though, you first have to select the column in the grid by clicking the *column selector* — the narrow block at the top of each column in the grid.

Table 1-4 lists some of the things you can do to make changes in the design grid.

Table 1-4 Editing Your Query

When You Want To . . .	*Here's What to Do*
Move a column	Click the column selector to select the column, click a second time, and then drag the column to its new position.
Delete a column	Click the column selector to select the column; then press the Delete key on your keyboard to delete the column.
Insert a column	Drag a field from the Table pane in Design view to the column in the design grid where you want to insert it. Access inserts an extra column for the new field, moving all other columns to the right to make space for the new column.
Change the displayed name	Use a colon between the display name and the actual name of the field in the Field row *(display name: field name).*

Sorting a query

You can sort or alphabetize the results of a query in several ways. The first way is to use the Sort row in the design grid. Use the Sort row to tell Access which field to use to sort the datasheet. The second way is to use the Sort Ascending and Sort Descending buttons on the datasheet toolbar. (For more on sorting in a datasheet, see Book II, Chapter 3.)

TIP

If you sort a query by date, Access alphabetizes the months — which is usually not what you want. Reports, on the other hand, know how to put months in chronological order. If you have monthly data that you want to sort, a report is a better object to use than a query.

To sort by a field, display your query in Design view and follow these steps:

1. **Move the cursor to the Sort row in the column that contains the field by which you want to sort the records that the query selects.**
2. **Display the drop-down list for the Sort row.**

   Access displays the options for sorting: Ascending, Descending, and (not sorted).
3. **Choose to sort in ascending order or descending order.**

You can use the Sort row in the design grid to sort by more than one field. You may want to sort the records in the datasheet by last name, for example, but more than one person may have the same last name. You can specify another field (perhaps `First Name`) as the second sort key.

When you sort using more than one field, Access always works from left to right, first sorting the records by the first field (the primary sort key) that has Ascending order or Descending order in the Sort row, and then using the second sort key to sort any records that have the same *primary* sort-key value.

REMEMBER

You cannot sort by the following field types: Memo, OLE, Attachments, or multivalue Data Type.

Viewing top values

Return: All

If all you care about are the top values produced by a query, you can tell Access to find and display only those records. Use the Top Values box in the Design View toolbar to see the top records produced by the query. A value in the Top Values box specifies exactly how many records in the datasheet you want shown; a percentage shows you that percentage of the records that the query finds.

TIP

Note that using a percentage does not show values that fall in the top *x*percent; it shows you the top *x*percent of the values. Say you are looking at test scores of twenty students. The test scores fall between 0 and 100, but are mostly in the 80s and 90s. If you ask to see the top 20 percent, Access shows you the top 4 scores (20 percent of 20 records), not the scores that are 80 or above. To see the scores that are 80 or above, type the criterion **>=80** in the Test Score column in the design grid.

To display the top values found by a query, follow these steps:

1. **Create your query with all the fields and criteria that you need.**
2. **Choose the field you want to sort by, and then set the Sort row to either Ascending order or Descending order.**

   Access uses this to figure out which top values you're looking for. For instance, if we sort products using the `Selling Price` field, and sort in Ascending order, the cheapest products are at the top of the datasheet. When we ask for the top five prices, we get the five cheapest products. To get the most expensive products, we sort in Descending order so the most expensive products appear at the top of the datasheet.
3. **Change the Top Values option by typing in a value or a value followed by a percent sign.**

   You can also choose a value from the drop-down list. To see the top three values, type in **10**. To see the top 3 percent of the values, type in **3%**.
4. **Click the View button to see only the top values in the datasheet.**

Hiding fields

You can use fields to sort data — or use criteria for the fields to filter data — without having to display the field in the query datasheet. Deselect the Show check box (in the design grid) when you don't want to display the column in the datasheet. (The next time you open the query in Design view, you find that Access has moved the hidden field(s) to the right side of the grid. If the field is hidden and not used for sort order or criteria, Access removes it from the grid.)

Changing the format of a query field

The format of fields displayed in a query is determined by the field's properties in its native table. If the field is defined as having a currency format in its table, then that's what you see in the query. Note, however, that you can change the format of any field for the query.

To change the format of a field, follow these steps:

1. **In Design view, right-click anywhere in the column that contains the field you want to format, and then choose Properties from the shortcut menu.**

   If a Properties sheet is displayed already, just clicking the field displays the properties for that field.

2. **Click in the `Format` property, and then click the arrow to display the format options.**

   The list of available formats drops down.

3. **Choose a format option from the drop-down list.**

The format options in the Properties sheet are exactly the same as the options for the `Format` property in the field properties for a table, and you can use them in exactly the same way. However, when you format a field in a query, you only affect how that field appears in the query datasheet. (Formatting fields is covered in detail in Book II, Chapter 1.)

Limiting Records with Criteria Expressions

In addition to using queries to select only a few fields to show, you may also (even often) use queries to display a limited selection of records. Criteria enable you to limit the records that the query displays. You use the Criteria and Or rows in the design grid to tell Access exactly which records you want to see.

Querying by example

Querying by example — QBE, for short — makes defining criteria easy: If you tell Access what you're looking for, Access goes out and finds it. For example, if you want to find values equal to 10, the criterion is simply `10`. Access then finds records that match — that are equal to 10.

The most common type of criterion is a logical expression. A logical expression gives a `Yes` or `No` answer. Access shows you the record if the answer is `Yes`, but does not show the record if the answer is `No`. The operators commonly used in logical expressions include <, >, `AND`, `OR`, and `NOT`.

Although we use uppercase to distinguish operators and functions, case does not matter in the design grid.

If you want to find all the addresses in California, the criterion for the `State` field is simply the following:

```
CA
```

You may want to add another criterion in the next line (`OR`) to take care of different spellings, as follows:

```
California
```

Access puts the text in quotes for you. The result of the query is all records that have either `CA` or `California` in the `State` field.

TIP

You can find records with null values by using the `Is Null` criterion. If you want all records except those with null values, use the `Is Not Null` criterion.

Using dates, times, text, and values in criteria

Access does its best to recognize the types of data you use in criteria; it relies on its best guess when providing characters to enclose the elements of the criteria expressions you come up with. You are, however, less likely to create criteria that Access doesn't understand if you use those characters yourself.

Table 1-5 lists the types of elements you may include in a criteria expression — as well as the character to use to make sure Access knows the element is text, a date, a time, a number, or a field name.

Table 1-5 Dates, Time, and Text in Criteria

Use This Type of Data . . .	*In an Expression Like This . . .*
Text	`"`*`text`*`"`
Date	`#1-Feb-97#`
Time	`#12:00am#`
Number	`10`
Field name	`[`*`field name`*`]`

You can refer to dates or times by using any allowed format. `December 25, 2006`, `12/25/06`, and `25-Dec-06` are all formats that Access recognizes. You can use AM/PM or 24-hour time.

Using operators in criteria expressions

Don't be surprised if your criteria are frequently more complicated than "all records with California in the State field." You use operators in your criteria expressions to tell Access about more complex criteria.

Table 1-6 lists the operators that you're likely to use in an expression that specifies criteria.

Table 1-6 Using Operators in Criteria

Relational Operator	*What It Does*
=	Finds values equal to text, a number, or date/time ("equal to" is understood when you type a criterion without an operator — you don't need to type it).
<>	Finds values not equal to text, a number, or date/time.
<	Finds values less than a given value.
<=	Finds values less than or equal to a given value.
>	Finds values greater than a given value.
>=	Finds values greater than or equal to a given value.
BETWEEN	Finds values between or equal to two values.
IN	Finds values or text included in a list.
LIKE	Finds matches to a pattern.

When you type your criterion, you don't have to tell Access the field name. Just put your criterion in the same column as the field, and Access applies the criterion to the field that appears in the same column.

Table 1-7 explains how different criteria affect the records that appear onscreen in the query datasheet.

Table 1-7 Examples of Criteria with Operators

When Field1 Has This Criteria	*These Are the Records You See*
<15	Displays records where Field1 is less than 15.
<#9/1/03#	Finds records where Field1 contains a date before September 1, 2003.
>15	Finds records where Field1 is greater than 15.
>#12:00am#	Finds records where Field1 is a time value after 12:00 a.m.
>[Max Price]	Finds records where Field1 is more than the value in the field Max Price.

When Field1 Has This Criteria	These Are the Records You See
`<>15`	Finds records where `Field1` is not equal to 15.
`>10 AND <20`	Finds records where `Field1` is between 11 and 19.
`>=10 AND <=20`	Finds records where `Field1` is between 10 and 20, including 10 and 20.
`BETWEEN 10 AND 20`	The same as `>=10 AND <=20.`
`IN ("Virginia", "VA")`	Finds records where `Field1` contains either `Virginia` or `VA.`
`LIKE "A*"`	Finds records where `Field1` begins with the letter `A`. You can use `LIKE` with wildcards such as `*` to tell Access in general terms what you're looking for. For more information on the wildcards that Access recognizes, see Book II, Chapter 5.

Using multiple criteria

Often one criterion is not enough. You may want to prune down the records displayed by using multiple criteria for a single field or multiple criteria for different fields. To get the data you want, however, you do need to know how Access combines your criteria.

When you have criteria for only one field, decide whether you want to see records that meet all criteria (in which case, join the criteria with AND) or whether you want records that meet only one criterion (in which case, join the criteria with OR). Of course, you may have three or more criteria, and you can join them with both AND and OR.

To join criteria for a single field with AND, type them into the Criteria line of the grid with AND between them — like this:

```
<5 And >65
```

shows you records with values less than five as well as those greater than sixty-five.

To join multiple criteria for one field with OR, use one of these methods:

- Type your expressions into the Criteria row, separating them with OR.
- Type the first expression into the Criteria row, and type subsequent expressions using the Or rows in the design grid.

Whichever approach you take, the result is the same — Access displays records in the datasheet that satisfy one or more of the criteria expressions.

When you have criteria for different fields, you join them with either the OR or the AND operator. The operator is implied in the way you put the criteria into the design grid. Here's how that works:

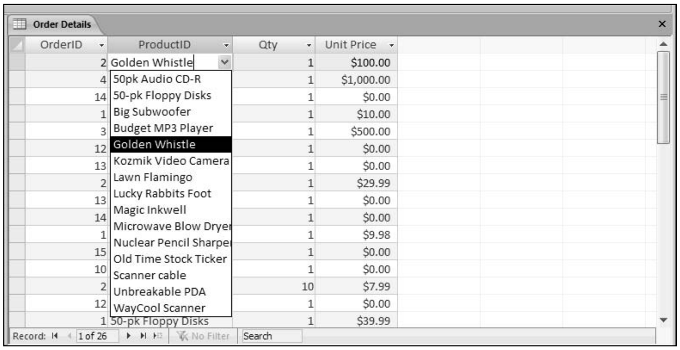
- **Criteria on the same row are implicitly joined by AND.** Access assumes that you want to find records that meet all the criteria. If you type criteria on the same row for two fields, a record has to meet both criteria to be displayed in the datasheet.
- **Criteria on different rows are joined by OR.** Access assumes that you want to find records that meet at least one criterion. If you type criteria on different rows for two fields, a record has to meet only one criterion to be displayed in the datasheet.
- **When you use multiple rows for criteria, the expressions on each row are treated as though they are joined by AND, but each row's worth of criteria are treated as though they are joined by OR.** Access first looks at one row of criteria and finds all the records that meet all the criteria on that row. Then Access starts over with the next row of criteria, the Or row, and finds all the records that meet all the criteria on that row. The datasheet displays all the records that are found. A record has to meet all the criteria on only one row to display in the datasheet.

Using lookup fields in criteria

When you define a criterion for a query, you tell Access what you are looking for — either by entering a value or by using a logical expression. However, if you use a criterion to limit the number of records displayed from a lookup field, you have to figure out exactly what value you want to find — and that may not be the value you see in the table. See Book II for how to create a lookup field.

How about an example? You want to find orders for the Budget MP3 Player. The Order Details table stores this data, shown in Figure 1-8. Notice that the ProductID field is a lookup field — it displays values from the Product Name field of the Products table, but stores the values from the Products table primary key field, which is ProductID. The Product table is shown in Figure 1-9.

Because the ProductID field in the Order Detail table is a lookup field, the criteria need to refer to the value that is stored in the field, not the value that displays. The value that is stored is the primary key field from the Products table. The value that displays is the product name. If we enter Budget MP3 Player for the ProductID criterion and then try to view the datasheet, we see a Data type Mismatch in Criteria Expression error message. We need to go back to the Products table and find the ProductID number for the Budget MP3 Player. (***Remember:*** A lookup field always stores the primary key field.)

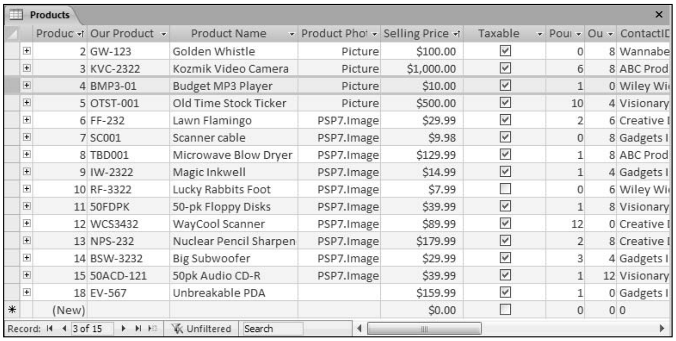


Order Details

OrderID	ProductID	Qty	Unit Price
2	Golden Whistle	1	$100.00
4		1	$1,000.00
14		1	$0.00
1		1	$10.00
3		1	$500.00
12		1	$0.00
13		1	$0.00
2		1	$29.99
13		1	$0.00
14		1	$0.00
1		1	$9.98
15		1	$0.00
10		1	$0.00
2		10	$7.99
12		1	$0.00
1	50-pk Floppy Disks	1	$39.99

- 50pk Audio CD-R
- 50-pk Floppy Disks
- Big Subwoofer
- Budget MP3 Player
- Golden Whistle
- Kozmik Video Camera
- Lawn Flamingo
- Lucky Rabbits Foot
- Magic Inkwell
- Microwave Blow Dryer
- Nuclear Pencil Sharpe
- Old Time Stock Ticker
- Scanner cable
- Unbreakable PDA
- WayCool Scanner

Figure 1-8: The ProductID field in the Order Details table is a lookup field.



Products

	Produc	Our Product	Product Name	Product Phot	Selling Price	Taxable	Poul	Ou	ContactID
⊞	2	GW-123	Golden Whistle	Picture	$100.00	☑	0	8	Wannabe
⊞	3	KVC-2322	Kozmik Video Camera	Picture	$1,000.00	☑	6	8	ABC Prod
⊞	4	BMP3-01	Budget MP3 Player	Picture	$10.00	☑	1	0	Wiley Wi
⊞	5	OTST-001	Old Time Stock Ticker	Picture	$500.00	☑	10	4	Visionary
⊞	6	FF-232	Lawn Flamingo	PSP7.Image	$29.99	☑	2	6	Creative I
⊞	7	SC001	Scanner cable	PSP7.Image	$9.98	☑	0	8	Gadgets I
⊞	8	TBD001	Microwave Blow Dryer	PSP7.Image	$129.99	☑	1	8	ABC Prod
⊞	9	IW-2322	Magic Inkwell	PSP7.Image	$14.99	☑	1	4	Gadgets I
⊞	10	RF-3322	Lucky Rabbits Foot	PSP7.Image	$7.99	☐	0	6	Wiley Wi
⊞	11	50FDPK	50-pk Floppy Disks	PSP7.Image	$39.99	☑	1	8	Visionary
⊞	12	WCS3432	WayCool Scanner	PSP7.Image	$89.99	☑	12	0	Creative I
⊞	13	NPS-232	Nuclear Pencil Sharpen	PSP7.Image	$179.99	☑	2	8	Creative I
⊞	14	BSW-3232	Big Subwoofer	PSP7.Image	$29.99	☑	3	4	Gadgets I
⊞	15	50ACD-121	50pk Audio CD-R	PSP7.Image	$39.99	☑	1	12	Visionary
⊞	18	EV-567	Unbreakable PDA		$159.99	☑	1	0	Gadgets I
*	(New)				$0.00	☐	0	0	0

Figure 1-9: The Products table holds the data shown in the Order Details table drop-down list.

The ProductID for the Budget MP3 Player is 4 (see the highlighted line of Figure 1-9). With that information we can create the query criteria — it is 4 .

Queries with multivalue lookup fields

Multivalue lookup fields make queries a little more complicated. The question is whether you want to display the complete multivalue field with each value separated by a comma, or put each value on its own line in the query datasheet. If you want to do complicated analysis with multivalue fields, you might want to reconsider your database design, and add tables and fields in order to save the same data without the multivalue field.

Although a multivalue lookup field seems cumbersome, it can still give you the results you want if you simply have your query display the multiple values separated by commas. If you want to deconstruct your data some — and ensure each value in a multivalue field has its own line — you'll need to add the Value property to the field name. Here's how: Instead of just *multivalue field name* in the query grid, enter ***Multivalue Field name.Value***.

In addition to the special instructions about multivalue fields, remember the caveat about lookup fields: The value you see may not be the value that is actually stored. (Fortunately, the preceding section offers tips on using lookup fields in your criteria.)

Working with Multiple Related Tables

One powerful feature of queries is the ability to view related fields from different tables together in a query datasheet. For instance, using our database, we can create a query to list customer name and contact information with order dates and numbers, even though two different tables store the data. The relationship between the two tables is the `ContactID` field, which is the primary key of the Address Book table. The same field, `ContactID`, is in the Orders table — it identifies the customers who placed each order. (For more information about relating tables, see Book I, Chapter 3 and Book II, Chapter 6.)

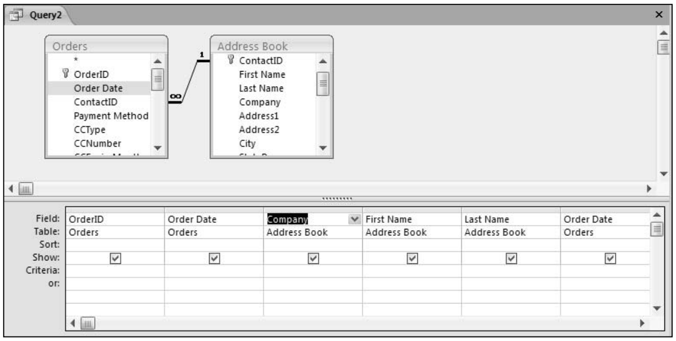
In order for Access to display data from different tables, a relationship must be defined between the tables. A relationship between tables is created in one of these ways:

- A lookup field exists, creating a relationship between two tables. For more on lookup fields, see Book II, Chapter 5.
- A relationship was defined in the Relationships window, as described in Book II, Chapter 6. (Creating a lookup field automatically creates a corresponding relationship in the Relationships window.)
- Access automatically creates a relationship when it finds related fields in two tables — that is, if the two fields have the same name and data type, and one of the matching fields is the primary key of its table.
- You create a relationship in Design view when defining a query.

When a relationship exists between two tables displayed in Design view, the tables appear joined by a line, as in Figure 1-10.

If you use data from two tables that are not directly related, you have to make sure any other tables that relate the fields you want to display in the query datasheet, appear in the Query Design view.

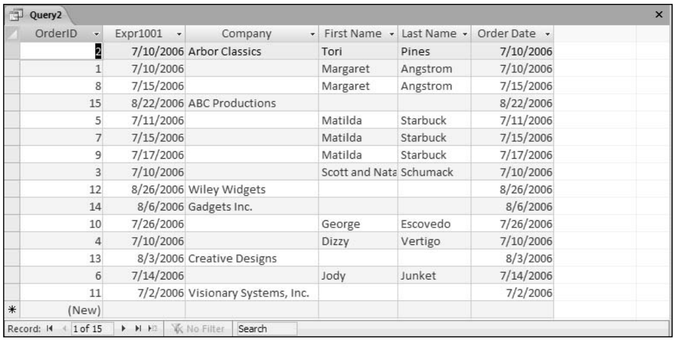
If referential integrity is enforced, the “1” and “∞” symbols appear on the relationship line to denote the “one” and “many” sides of the relationship. If referential integrity is not enforced, those symbols do not appear on the line (see Book II, Chapter 6 for more on referential integrity).



Field:	OrderID	Order Date	Company	First Name	Last Name	Order Date
Table:	Orders	Orders	Address Book	Address Book	Address Book	Orders
Sort:						
Show:	☑	☑	☑	☑	☑	☑
Criteria:						
or:						

Figure 1-10: A query combining data from two related tables.

Figure 1-11 shows the result of the query shown in Figure 1-10 — each order is listed once, with the name of the customer. Many customers have multiple orders, so they appear more than once in the datasheet.



OrderID	Expr1001	Company	First Name	Last Name	Order Date
2	7/10/2006	Arbor Classics	Tori	Pines	7/10/2006
1	7/10/2006		Margaret	Angstrom	7/10/2006
8	7/15/2006		Margaret	Angstrom	7/15/2006
15	8/22/2006	ABC Productions			8/22/2006
5	7/11/2006		Matilda	Starbuck	7/11/2006
7	7/15/2006		Matilda	Starbuck	7/15/2006
9	7/17/2006		Matilda	Starbuck	7/17/2006
3	7/10/2006		Scott and Nata	Schumack	7/10/2006
12	8/26/2006	Wiley Widgets			8/26/2006
14	8/6/2006	Gadgets Inc.			8/6/2006
10	7/26/2006		George	Escovedo	7/26/2006
4	7/10/2006		Dizzy	Vertigo	7/10/2006
13	8/3/2006	Creative Designs			8/3/2006
6	7/14/2006		Jody	Junket	7/14/2006
11	7/2/2006	Visionary Systems, Inc.			7/2/2006
(New)					

Figure 1-11: This datasheet shows the results of the query shown in Figure 1-10.

Joining tables in Design view

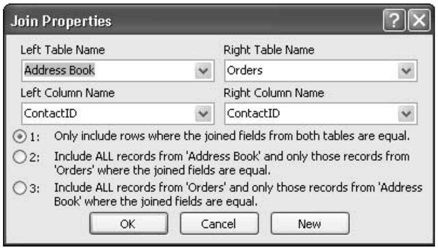
Although you can create or edit a relationship between two tables in Design view, remember: The relationship defined in Design view is used only for the query; it's not used in any other part of the database. You can use a type of join that you may not want to use in the database as a whole, but that you may find useful for a single query (which you may then use as the source data for a form or report). You can also delete a relationship in Design view without deleting the same relationship in the Relationships window. (To delete the join, click the line and then press the Delete key.)

To create a join, you use the Table pane of Design view and follow the same procedure you use when creating a relationship in the Relationship window — you first identify the two related fields (each in a different table) you want to join, and then you drag the field from one table to the related field in the other table. Voilà — a join!

Choosing the type of join and setting join properties

You can edit the join properties of a relationship for the query in Design view. To do so, double-click the relationship line to see the Join Properties dialog box, as shown in Figure 1-12. If you have trouble double-clicking the relationship line, keep trying! The tip of the pointer needs to be right on the line.

The new properties apply only in the current query, and not in any other objects in the database except those based on this query.



Join Properties

Left Table Name: Address Book
Right Table Name: Orders
Left Column Name: ContactID
Right Column Name: ContactID

● 1: Only include rows where the joined fields from both tables are equal.
○ 2: Include ALL records from 'Address Book' and only those records from 'Orders' where the joined fields are equal.
○ 3: Include ALL records from 'Orders' and only those records from 'Address Book' where the joined fields are equal.

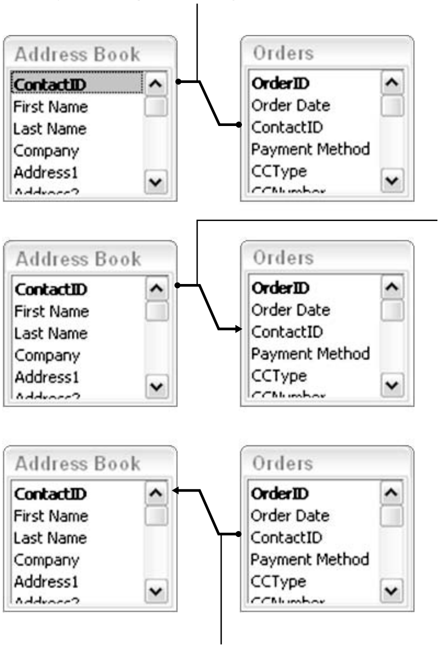
Figure 1-12: The Join Properties dialog box.

The Join Properties dialog box options are largely self-explanatory, but using the dialog box effectively requires knowledge of a few buzzwords that describe particular types of relationships — but don't appear in the dialog box. The buzzwords — *inner join, left outer join, right outer join* — are included in the descriptions of the following three options:

- **Option # 1 (Inner join):** A query displaying records from both tables displays only those records that have counterparts in the related table. Records that don't have matching partners in the opposite table are hidden, as though they didn't even exist. This is the default, meaning that if you don't set a join type, this is what you get.
- **Option # 2 (Left outer join):** A query displaying records from both tables displays all records from the table on the left. From the table on the right, only records that have matching partners from the table on the left appear.
- **Option # 3 (Right outer join):** A query displaying records from both tables displays all records from the table on the right. From the table on the left, only records that have matching partners from the table on the right appear.

The line that connects two tables in the Relationships view (and in Design view as well) reflects information about how the tables are joined, as shown in Figure 1-13. The arrow points to the table that contributes matching records — all records from the other table display in the query datasheet.

Inner join: Only matching records from both tables.



Left outer join: All records from the left table; only matching records from the right table.

Right outer join: All records from the right table; only matching records from the left table.

Figure 1-13: Join lines and outer joins.

When would you use an outer join? If you create a sales report and want to see products that haven't sold at all, you want an outer join that shows all the products from the Products table, regardless of whether they appear in the Order Details table.

If you create a query with fields from two tables that don't have a relationship defined, Access doesn't know how to relate records, so *every* combination of records between the two tables displays in the datasheet. Generally (as you might expect) these queries won't give you meaningful results.

Working with Query Datasheets

A query datasheet looks a great deal like a table datasheet — you can sort, filter, navigate, and in some circumstances, enter data in the query datasheet. The data displayed in the query datasheet is sometimes referred to as a *dynaset* — a *dyna*mic sub*set* of your data.

The query result reflects changes in the data in your tables. The actual records displayed in a dynaset aren't stored in the database; only the design of the query is stored. Each time you open the query in Datasheet view, the query definition determines which records appear in the datasheet.

Because working with queries in Datasheet view is similar to working with tables in Datasheet view, turn to Book II for specific instructions on working in the Datasheet view.

To toggle between Datasheet and Design view, click the View button, the first button on the Home and Design/Datasheet tabs on the Ribbon.

Using the query datasheet to edit data

In many cases, you can edit the data in the query datasheet and use the datasheet to add new records. Any changes you make are reflected in the table that holds the data you changed — edits are permanent and apply to the underlying tables and not just to the query.

When your query includes fields from multiple tables, you may see some funky things on-screen when you edit data — not to worry — they're all features!

✦ You may see other data in the datasheet change when you make an edit. If your query includes related tables, you may see repeated data, such as the repeated names in Figure 1-11. If you make edits, you see all the repetitions of the name change when you change one instance. Because you are changing a single record repeated in the datasheet, the other instances change to reflect the change in the underlying table. When this happens, you have happened on an AutoLookup query. The next section covers AutoLookup queries.

✦ If your query meets the qualifications of an AutoLookup query, Access may fill in fields after you enter a single value.

If you work with a query datasheet that shows data from multiple related tables, you may not be able to modify data. The rules get complicated, but generally all data on the "many" side of a one-to-many relationship can be updated. Data on the one side usually can be updated if you are not editing the primary key field.

AutoLookup queries to fill in data automagically

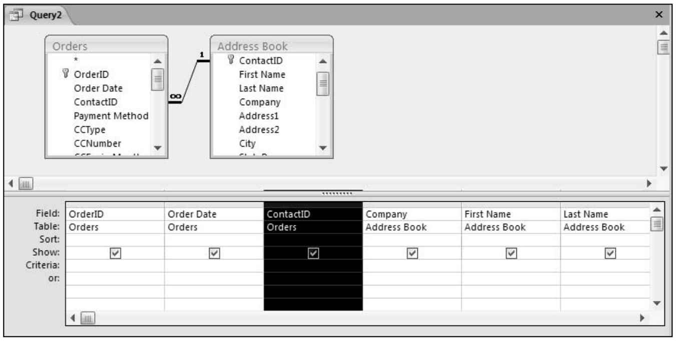
AutoLookup queries can be a terrific tool when you want to enter one value (such as a customer number) and see other data from the same table (such as the customer's name, address, and phone number). You may want to use this feature as you enter a new order — you can enter a customer number and see the contact information, and then enter the particulars of the order, such as the date and payment method. You can even create an AutoLookup query and use it as the basis of a form, where it may be more convenient to enter data. AutoLookup queries may sound complicated, but in fact they're pretty simple.

TIP

The AutoLookup feature also works in forms.

The key to creating an AutoLookup query is that you must include the `Join` field from the "many" side of the one-to-many relationship (also known as the foreign key). Then when you enter a value for that field, Access fills in other fields from the "one" side of the relationship automatically.

For instance, the query in Figure 1-14 displays fields from the Orders and Address Book tables. The `ContactID` field comes from the Orders table (the key field on the "one" side, but displayed from the "many" table).



Field:	OrderID	Order Date	ContactID	Company	First Name	Last Name
Table:	Orders	Orders	Orders	Address Book	Address Book	Address Book
Sort:						
Show:	☑	☑	☑	☑	☑	☑
Criteria:						
or:						

Figure 1-14: An AutoLookup query.

When new orders are entered into the query datasheet, only the customer number needs to be entered — Access automatically fills in the first name, the last name, and other contact information from the Address Book table. The rest of the Order information can then be added.

Saving Queries

REMEMBER

A query doesn't store data — it just pulls data out of tables and puts it in query datasheets for you to look at. A query is dynamic — as you add to or change your data, the result of the query also changes. When you save your query, you're not saving the table that the query produces — you're just saving the query *design* so you can ask the same question again.

You don't have to save a query. Often you create queries on the fly to answer a question. No need to clutter your database with queries you're unlikely to need again.

Importing and exporting queries

If the query you need is in another Access database — or if you create a query that you want to use in another database — simply import or export it. Information on importing and exporting objects is in Book II, Chapter 4.

That said, you can certainly save a query design when you need to. Use one of the following methods:

- **In Design or Datasheet view, click the Save button or press Ctrl+S.** If you haven't saved the query yet, Access asks you for a name for the query. Type the name in the Save As dialog box and then click OK.
- **Close the query (clicking the Close button is a popular method).** If you've never saved the query, or if you've changed the query design since you last saved it, Access asks whether you want to save the query. Click the Yes button to save the query. If you've never saved the query, give it a name in the Save As dialog box and click OK.

TIP

Give your new query a name that tells you what the query does. That way, you won't have to open one query after another to find the one you're looking for.

If you want to create a query similar to one you already have in your database, select or open the query and choose Save As from the File menu (click the icon in the top-left corner of the Access window to display the File menu) to save the query with a new name. You keep the original query and make changes to the new copy.

If you want to save the query dynaset, create a snapshot query with the data (covered in Book V, Chapter 2) or export the data to its own file, using one or more buttons in the Export group of the External Data tab on the Ribbon. For more about exporting data, see Book II, Chapter 4.

Chapter 2: Letting Queries Do the Math

In This Chapter

- **Doing calculations in queries**
- **Writing expressions for math**
- **Going beyond basic arithmetic**
- **Calculating dates and times**
- **Manipulating text with expressions**
- **Writing decision-making expressions**
- **Creating flexible parameter queries**
- **Calculating totals, subtotals, averages, and such**
- **Finding duplicate records**

If you ever find yourself doing math to figure out what to put into a field, then you made a mistake when designing your table. A table needs only the raw data — the factual information that cannot be calculated from known data. For example, a table may contain `Qty` and `Unit Price` fields to indicate how may items — and at what price — some product was ordered. But having an `Extended Price` or `Subtotal` field in the table is pointless, because Access is smart enough to determine that on its own by multiplying the `Qty` field by the `Unit Price` field for you.

Letting Access do the math for you has advantages beyond just saving you the time of doing the calculation yourself. For one thing, Access can do any mathematical calculation, no matter how complex, in less time than you take to blink your eye — and the calculations are always correct. No need to worry about typing a wrong value into an `Extended Price` field, or forgetting to change the field after you change the `Qty` or `Unit Price` fields. Just let Access do all the math.

Doing Math in Queries

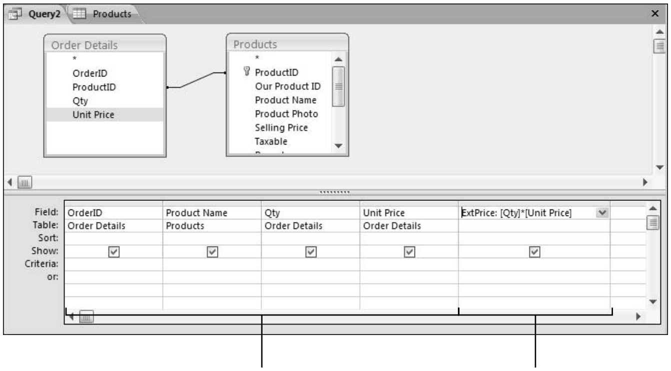
Access can do the math for you in queries, forms, reports, and macros. In many cases you should do the math in a query, because that way any forms, reports, or macros that use the query automatically have access to the calculated value. To do the math in a query, you create a *calculated field* within the query. Unlike a regular field in a query, a calculated field's name does not match any of the field names in the tables. In fact, its value doesn't come directly from any field in any table. The calculated field exists only in the query.

A calculated field starts out with a field name, followed by a colon, and then an expression that defines the field's contents, in this order:

```
fieldname:expression
```

where *fieldname* is any name you want (provided it doesn't match the name of a field in a table) and *expression* is a formula that tells the query how to do the math.

Take a look at Figure 2-1, which shows a query in Design view. The first four field names at the top of the Query by Example grid — `Order ID`, `Product Name`, `Qty`, and `Unit Price` — are regular fields that get their values from either the Order Details or Products table in the top pane of the Design View window. The last field:



Field:	OrderID	Product Name	Qty	Unit Price	ExtPrice: [Qty]*[Unit Price]
Table:	Order Details	Products	Order Details	Order Details	
Sort:					
Show:	☑	☑	☑	☑	☑
Criteria:					
or:					

Regular fields from tables

Calculated field

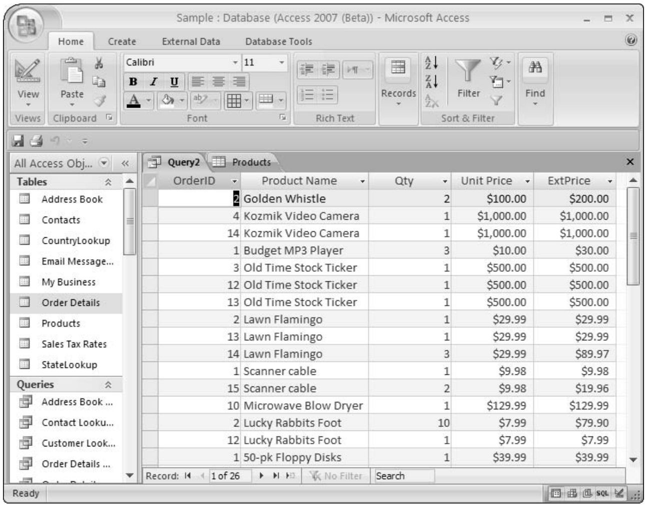
Figure 2-1: The ExtPrice column is an example of a calculated field in a query.

```
ExtPrice: [Qty] * [Unit Price]
```

is a calculated field. The field name is `ExtPrice` (short for "extended price"). The expression is `[Qty] * [Unit Price]`, which means "The `Qty` (quantity field) times the `Unit Price` field."

Figure 2-2 shows the same query as Figure 2-1, but in Datasheet view. Notice two things about this Datasheet view:

- ✦ The `ExtPrice` field looks just like any other field.
- ✦ The value shown in the `ExtPrice` column is equal to the value of the `Qty` field times the `Unit Price` field in each column.



OrderID	Product Name	Qty	Unit Price	ExtPrice
2	Golden Whistle	2	$100.00	$200.00
4	Kozmik Video Camera	1	$1,000.00	$1,000.00
14	Kozmik Video Camera	1	$1,000.00	$1,000.00
1	Budget MP3 Player	3	$10.00	$30.00
3	Old Time Stock Ticker	1	$500.00	$500.00
12	Old Time Stock Ticker	1	$500.00	$500.00
13	Old Time Stock Ticker	1	$500.00	$500.00
2	Lawn Flamingo	1	$29.99	$29.99
13	Lawn Flamingo	1	$29.99	$29.99
14	Lawn Flamingo	3	$29.99	$89.97
1	Scanner cable	1	$9.98	$9.98
15	Scanner cable	2	$9.98	$19.96
10	Microwave Blow Dryer	1	$129.99	$129.99
2	Lucky Rabbits Foot	10	$7.99	$79.90
12	Lucky Rabbits Foot	1	$7.99	$7.99
1	50-pk Floppy Disks	1	$39.99	$39.99

Figure 2-2: The query from Figure 2-1 in Datasheet view.

Even though the ExtPrice column in Datasheet view looks like a regular field, it doesn't behave exactly like a regular field. If you try to change the contents of the ExtPrice field, Access won't let you. The contents of the ExtPrice field in this query *always* show the quantity times the unit price, and cannot possibly show anything else, because it's a calculated field.

However, if you change the Qty or Unit Price field in any record, the ExtPrice field instantly — and automatically — changes to show the correct result based on the change you make. If (for example) you change the Qty field in the first record in Figure 2-1 from 1 to 2, the ExtPrice field for that record then shows $200.00.

Follow these steps to create calculated fields in queries:

1. **Create a normal select query, like any of those shown in Chapter 1 of this minibook.**
2. **Add any fields you want the query to display to the Field row of the QBE grid.**
3. **To add a calculated field, pick any empty column, type a unique, new field name into the Field row, followed by a colon (:) and an expression that performs the calculation.**

   What you get will look a lot like the ExtPrice calculated field shown in Figure 2-1.

Zooming in on expressions

The tiny space provided in the Field row of the QBE grid doesn't exactly make typing lengthy expressions easy. In fact, the text may be so small, you have difficulty seeing even when typing a short expression.

To see what you're typing, press Shift+F2 while the cursor is in the calculated field — or right-click in the calculated field and choose the Zoom option from the shortcut menu. The Zoom dialog box opens, showing what you already typed into the field (if anything). You can use all the standard Windows text-editing keys and techniques to type your expression. For example, press the End key to move the cursor quickly to the end of the expression.

To make the text easier to read, click the Font button. In the Font dialog box that opens, choose a larger font size and then click OK in the Font dialog box to accept the change. Type your expression, and then click OK in the Zoom dialog box to copy the expression into your calculated field in the QBE grid.

Your query can contain any number of calculated fields — you're not limited to having just one or two. The big trick, of course, is knowing how to write the expression. When writing expressions, the possibilities are almost endless. But some basic tools and rules exist to help you create any expression, as we discuss next.

Writing Expressions in Access

An *expression* tells Access how to perform some calculation. An expression can contain operators, field names, literal text, or all of those — and may also use any of the Access built-in functions. Built-in functions can be mind-boggling, but if you take them one step at a time, you'll soon create them like a pro.

REMEMBER

Literal text, in Access jargon, means text that isn't the name of some field or other object. Whereas `LastName` may be the name of a field in a table, `Smith`, `Jones`, and `123 Oak Tree Lane` are all examples of literal text. Always put your literal text in quotes (`"Smith"`). For a classic example of how to use literals, flip ahead in this chapter to the "Using literal dates and times in expressions" section.

Using operators in expressions

An *operator* is a character that operates on data. Some of the more commonly used operators are listed in Table 2-1. The operators are listed in *order of precedence,* meaning the order in which Access does the calculations when an expression contains two or more operators.

Table 2-1 **Operators in Order of Precedence**

Operator	*Purpose*	*Example*
`( )`	Grouping	`(2+2)*5` returns `20`
`^`	Exponentiation (raising a number to a specified power)	`5^2` returns `25`
`* /`	Multiplication, Division	`5*6/3` returns `10`
`+ –`	Addition, Subtraction	`6+6–2` returns `10`
`&`	String concatenation (connecting chunks of text together)	`"Hello" & "There"` returns `HelloThere`

The order or precedence that operators follow can be a real "gotcha" if you're not careful. Take a look at the following simple expression that includes an addition operator (+) and a multiplication operator (*):

```
  5+3*2
```

When you do the math, do you get 16, or do you get 11? If you do the addition first (5+3 = 8) and then the multiplication (2 * 8), you end up with 16. But if you do the multiplication first (3*2 = 6) and then the addition (6 + 5), you end up with 11. So which is the correct answer, 11 or 16?

Give up? 11 is the correct answer (and the one Access comes up with) because the order-of-precedence rules state that multiplication and division are always performed before addition or subtraction.

Multiplication and division are at the same order of precedence. If an expression involves both of those operations, they're executed in left-to-right order. In the following expression, the division takes place first, because it's to the left of the multiplication:

```
10/5*3
```

The result of the expression is 6, because 10 divided by 5 is 2, and 2 times 3 equals 6.

Addition and subtraction work the same way. If an expression includes both addition and subtraction, the calculations take place in left-to-right order.

You can control the order of precedence using the parentheses. Access always works from the innermost parentheses to the outermost. The following expression is an example:

```
5^2+((5–1)*3)
```

When faced with this expression, Access goes inside the innermost parentheses first (`5-1`) and does that calculation. So the expression (for a brief instant in time) becomes

```
5^2+(4*3)
```

Access next calculates the remaining pair of parentheses in the expression (`4*3`). For a brief moment the expression becomes

```
5^2+12
```

Because no more parentheses are left, Access uses the regular order of precedence to do the rest of the calculation. Exponentiation has a higher order of precedence than addition, so for a brief instant the expression becomes

```
25+12
```

Access then does the final math and returns the result, `37`.

If you're a real math-head, you'll appreciate that two more operators have the same order of precedence as multiplication and division. One is the `\` operator, which returns only the integer portion of a quotient, and the other is `MOD` (for *modulo*), which returns only the remainder after division. For example, while `16/3` (normal division) returns `5.3333`, `16\3` returns `5`, and `16 MOD 3` returns `1`.

Field names in expressions

If you're thinking, "Big deal, I could have done those preceding calculations on my $2.00 calculator," that's certainly true. But Access expressions aren't limited to numbers and operators. You can use field names in expressions to perform math on data stored in fields. The sample query shown at the start of this chapter uses the field names `[Qty] * [Unit Price]` to multiply the value in the `Unit Price` field by the value in the `Qty` field.

Technically, you only need to enclose field names in square brackets when the field name contains a blank space, as in `[Unit Price]`. But you can put square brackets around any field name, just in case (so to speak). For the sake of consistency — and to make the field names in expressions stand out — we always put them in square brackets throughout this book.

The sample expression shown in the first query at the start of this chapter, `[Qty]*[Unit Price]`, is a prime example of using field names in expressions. The expression, in English, simply means "the contents of the `Qty` field in this record times the contents of the `Unit Price` field in this same record."

Using functions in expressions

Wait, there's more. An Access expression can also contain any number of functions. A *function* is sort of like an operator in that it performs some calculation and then *returns* some value. But the way you use a function is different. Every function includes a name followed by a pair of parentheses. For example, the `Date()` function always returns the current date.

Many functions accept *arguments*, which are enclosed within the parentheses. To calculate the square root of a number, you use a `Sqr()` function. The `Sqr()` function accepts one parameter — a number, the name of a field, or an expression that contains a number. The `Sqr()` function returns the square root of whatever value passes to it as an argument.

As an example, the following expression returns `9`, because the square root of 81 is 9 (because 9 times 9 is 81). In this example, we use a number as the argument to the `Sqr()` function:

```
Sqr(81)
```

Note that in the example, we use `81` as the argument to the `Sqr()` function. Another way to state that is to say we *pass* the number `81` to the argument. In other words, the term *pass* in this context means to use as an argument in a function.

The following `Sqr()` function uses an expression, `5*20`, as its argument:

```
Sqr(5*20)
```

Because the expression, `5*20`, is inside the parentheses, the multiplication happens first. For a brief instant, the function contains `Sqr(100)`. Then `Sqr(100)` returns `10`, because 10 is the square root of 100.

You can use field names in functions as well. Suppose you have a table that contains a number field named `bigNumber`. The following `Sqr()` function returns the square root of whatever value is stored in the `bigNumber` field:

```
Sqr([bigNumber])
```

Dozens of functions are built into Access. In fact, memorizing all of the functions is nearly impossible. We recommend looking up functions as you need them, using the Expression Builder as your guide. What's the Expression Builder? Read on and find out.

Using the Expression Builder

The *Expression Builder* is a tool to help you write meaningful expressions using any combination of operators, field names, and functions. To use the Expression Builder while creating a calculated field in a query, do the following:

1. **If you haven't saved the current query yet, do so now to name it (press Ctrl+S, type in a name for your query in the Save As dialog box, and click OK).**

2. **Type a new field name, followed by a colon (:) in the Field row of an empty column in the QBE grid.**

   The *Query by Example grid*, also known as the *QBE grid*, is in the bottom pane of the Design View window. For more on the QBE grid (and its lovely home, the Design View window), see Chapter 1 of this minibook.

3. **Right-click the empty space to the right of the colon you just typed and choose the Build option from the shortcut menu or click the Build button on the Design tab on the Ribbon.**

   The Expression Builder opens, looking like Figure 2-3. Any text you already typed into the QBE grid is already in the Expression Builder.

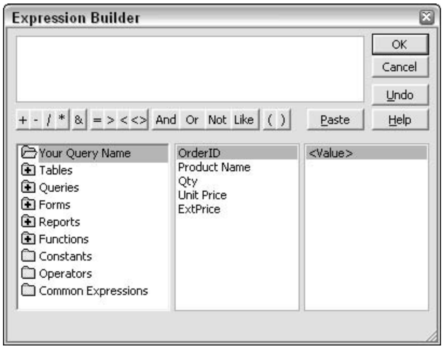
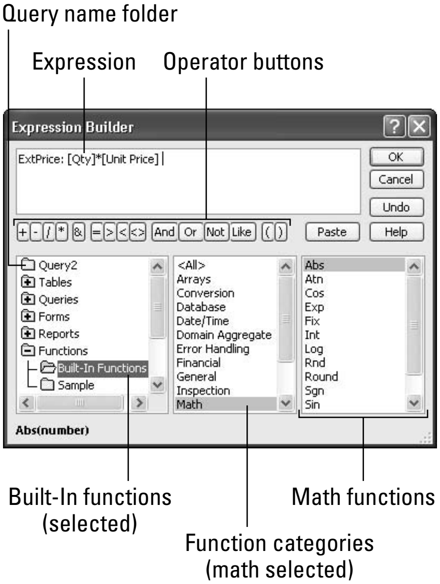


Figure 2-3: The Expression Builder.

Within the Expression Builder, the large white area at the top is where you compose your expression, as shown in Figure 2-4. You can type and edit in that large area using the keyboard and all the standard Windows editing techniques. Or use the buttons and folders below the white area to build an expression without typing.



ExtPrice: [Qty]*[Unit Price]

Figure 2-4: Main options for creating expressions in a query's calculated fields.

Not everything in the Expression Builder is geared toward creating expressions for queries. Some features of the Expression Builder are better suited to creating expressions in forms and reports. When you're working with a query, the main things you want to focus on are the following:

- **Operator buttons:** Click any of these buttons to insert an operator into your expression.
- **Query name:** Shows the name of the query that's currently open. When you click your query name, fields from that query appear in the center column. Clicking a field name in that center column adds the name to the expression.

  WARNING!

  If you don't save the query before opening the Expression Builder, clicking the Query Name folder in the Expression Builder won't display anything!
- **Built-In Functions folder:** If you double-click the + sign next to the Functions folder, a couple of options appear. Click the Built-In Functions folder to see categories and names of available functions in the center column. Click a category name in the middle column to see in the right column, names of functions within that category.

Whatever you insert into your expression is inserted at the blinking cursor's position or at the end of whatever text is currently in the expression if no blinking cursor is visible. If you need to move the cursor before inserting something into an expression, just click at the spot where you want to position the cursor. You can also use the ←, →, Home, or End keys to position the cursor. Use the Backspace and Delete (Del) keys to delete text in the expression. To undo your most recent change to an expression, click the Undo button in the Expression Builder or press Ctrl+Z.

Getting help with functions

Just seeing the name of a built-in function in the third column of the Expression Builder doesn't tell you much. You don't know what the function does or how you use it. But you can get instant information by using the Help button. Follow these steps to access a Help window:

1. **In the left column of the Expression Builder, if the Functions folder has a + sign next to it, first click that + sign to expand the list.**
2. **Click the Built-In Functions folder in the first column.**

   The category names appear in the center column.
3. **Click a category name in the middle column to see functions within that category listed in the third column (or click `<All>` in the middle column to see all functions in the third column).**

   The functions for that category appear in the third column.
4. **In the third column, click the name of the function you want to find out more about.**
5. **Click the Help button on the top-right side of the Expression Builder.**

   The Help window for that function opens. If you don't see specific help for the function, type the function name into the Access Help search box. Functions are listed by type in the Help system, so if you need to find a function in the Help system, you'll be able to find it quicker if you know if it's a Financial function, for example.

For instance, select the Financial category of functions in the center column, click the PV function in the third column, and then click the Help button. The Help page that opens not only describes what the PV function does, it also describes the syntax required for using the function. The *syntax* of a function describes what information you need to pass (provide) to the function in order for the function to do its calculation and return a result.

The syntax for a function usually looks something like the following:

```
functionName(arg1, arg2, [arg3])
```

where `functionName` is the name of the function, and `arg1`, `arg2`, and `arg3` represent arguments the function accepts. The number of arguments a function accepts varies. Some functions take no arguments, others take many. If a function accepts two or more arguments, they must be separated by a comma.

Any argument name in square brackets is optional, meaning you can omit the entire argument if you wish.

REMEMBER

Whether you use an optional argument or not, never type the square brackets into the function.

A function name is always followed by parentheses — even if the function accepts no arguments. `Now()`, `Sqr(81)`, and `PV(apr, TotPmts, Income)` are all examples of valid function syntax. Note as well that when typing an argument, you can use a literal value (like the name `"Smith"` or the number `10`), a field name, or an expression as an argument. The following three expressions all pass literal values to their functions:

```
Sqr(100)
PV(.035,120,250)
UCase("howdy")
```

The next three expressions all pass data from fields to the function (provided that `Hypot`, `Apr`, `Months`, `Amount`, and `Company` are the names of fields in the current query):

```
Sqr([Hypot])
PV([Apr],[Months],[Amount])
UCase([Company])
```

In the next examples, we use expressions as arguments:

```
Sqr(227 * [Hypot])
PV([Apr]/12,[Months]*12,-1*[Amount])
UCase([First Name] & " " & [Last Name])
```

We know these examples look weird, but we do have a reason for the madness. The ability to pass literal data, field names, and/or expressions to functions gives you a lot of flexibility.

About text in < and > brackets

When you use the buttons in the lower half of the Expression Builder to insert text into your expression, that text often includes *placeholders* — text in angle brackets (< >). You may see placeholders, such as `<expr>`, `<interval>`, `<npers>`, or something equally bizarre in the Expression Builder. Each of these brackety things is a placeholder for an argument that you need to type in.

If a placeholder represents an optional argument and you don't plan to use that argument, then you can just delete the placeholder. But if the placeholder represents a required argument, then you need to replace the placeholder with valid data. Using the Help feature often when working with functions is very important. We doubt that anybody has ever managed to memorize all the functions because of the sheer number, all supporting so many different arguments.

Nesting functions

You can nest functions, meaning you can put a function inside another function. Because Access always works from the innermost parentheses outward, the inside function is always calculated first. For example, the `Date()` function always returns the current date. (It requires no arguments.) The `WeekDay()` function accepts any date as an argument, meaning its syntax looks like the following:

```
WeekDay(date)
```

Because the `Date()` function always returns a date, you can use it as the argument to the `WeekDay()` function. The expression turns out to be

```
WeekDay(Date())
```

A number between 1 and 7 returns, indicating which day of the week today is. If the current date is the 23rd, for example, and that day is a Tuesday, the `WeekDay()` function returns the number `3`. (Day 1 is Sunday, 2 is Monday, and so forth).

Going Beyond Basic Arithmetic

Near the start of this chapter, we talked about how you can use the `+`, `–`, `*`, and `/` operators in expressions to perform simple arithmetic. As you know, not all math is quite that simple. Some calculations require more than addition, subtraction, multiplication, and division.

Access offers many mathematical and financial functions to help with more complex math. These functions all operate on numbers. For example, the math functions include `Cos()` (cosine), `Tan()` (tangent), and `Atn()` (arctangent), in case you need to do a little trigonometry in your queries. The financial functions include things such as `IRR()` (internal rate of return), `Fv()` (future value), `Ddb()` (double-declining balance depreciation). You're unlikely to need financial functions unless your work specifically requires those sorts of calculations. Rather than list all of the functions that allow you to do complex math, Table 2-2 lists a few examples to give you a sense of how they work.

Table 2-2 Examples of Built-In Math and Financial Functions

Function and Syntax	*Returns*	*Example*
`Abs(`*`number`*`)`	Absolute value (negative numbers convert to positive numbers).	`Abs(-1)` returns `1`
`Int(`*`number`*`)`	Integer portion of a number.	`Int(99.9)` returns `99`
`Round(`*`number`*` [,`*`decimals`*`])`	The numerical value *`number`* rounded to a specified number of decimal places (*`decimals`*).	`Round(1.56789,2)` returns `1.57`
`Pmt(`*`rate`*`, `*`nper`*`, `*`pv`*`[, `*`fv`*`[, `*`type`*`]])`	Payment on a loan or annuity.	`Pmt(.058/12, 30*12, -50000)` returns `293.3765` (payment on a $50,000 30-year loan at 5.8%)

If you need help with any function in the Expression Builder, remember you can find all the gory details you need to make the function work for you in the Help system.

What's with the 12s in the expression?

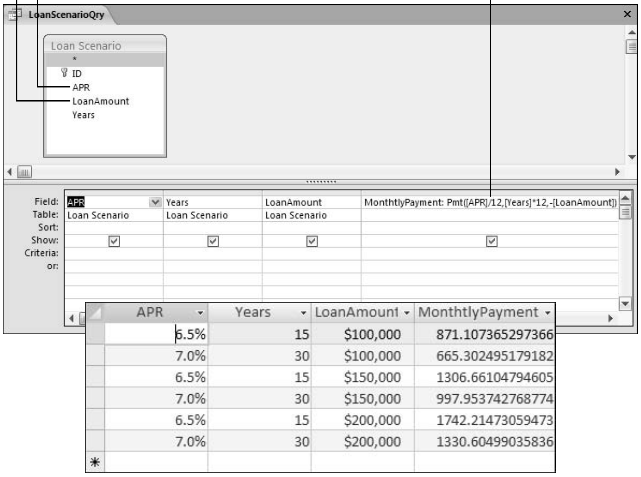
In case you're wondering why the sample expression contains things like `/12`, `*12`, and such, it all has to do with the way the `Pmt()` function works. The `APR` value is the annual percentage rate, and the term of the loan is expressed in years. When you want the `Pmt()` function to return a monthly payment, you need to divide the annual percentage rate by 12 (`[APR]/12`). You also need to multiply the number of years by 12 to get the number of monthly payments (`[Years]*12`).

Normally, `Pmt()` returns a negative number as the result, because each payment is a debit (expense). By placing a minus sign in front of the `LoanAmount` field name (that is, `–[LoanAmount]`), we convert that to a negative number (a debit), which in turn makes the calculated monthly payment into a credit (a positive number).

Formatting calculated numbers in queries

When you create a table and define a field as the Number data type, you can choose a format, such as `Currency`, for displaying that number. In a query, you don't predefine a field's data type. The number that appears as the result of a calculation is often just displayed as a *General number* — no dollar sign, no fixed number of decimal places.

Figure 2-5 shows a query based on a hypothetical table named Loan Scenarios. Within the Loan Scenarios table, the APR (annual percentage rate) is a Number field with its `Format` property set to Percent. The `LoanAmount` field is a Number field with its `Format` property set to Currency. Those formats carry over in the results of the query (the query's Datasheet view). But the calculated `MonthlyPayment` field's result displays as a General number with no currency sign, no commas, and a lot of numbers to the right of the decimal point, as you see in the lower half of Figure 2-5.


Currency format in table

Percent format in table

Calculated field

Field:	APR	Years	LoanAmount	MonththlyPayment: Pmt([APR]/12,[Years]*12,-[LoanAmount])
Table:	Loan Scenario	Loan Scenario	Loan Scenario	
Sort:				
Show:	☑	☑	☑	☑
Criteria:				
or:				

APR	Years	LoanAmount	MonththlyPayment
6.5%	15	$100,000	871.107365297366
7.0%	30	$100,000	665.302495179182
6.5%	15	$150,000	1306.66104794605
7.0%	30	$150,000	997.953742768774
6.5%	15	$200,000	1742.21473059473
7.0%	30	$200,000	1330.60499035836
*			

Figure 2-5: Calculated fields often display in General number format.

You can format a calculated field so the result appears in Currency format in a couple ways. If you intend to build any forms or reports based on this query, you can just save the query and forget about formatting the field. Later, when designing a form or report based on the query, you just create a control for the calculated field as you do any other field in the query. Then set that control's `Format` property to the Currency format in the form or report. The data looks the way you want in the form or report, and you don't have to mess around with the query at all.

See Book IV, Chapter 1 for the goods on creating forms and reports. See the section on setting control properties in Book IV, Chapter 2 for the specifics on formatting controls.

Optionally, if you have no intention of creating any forms or reports based on the query, then you can use one of the conversion functions to format the data. The conversion functions are listed in Table 2-3. They're all accessible via the Conversion category of the Built-In Functions folder in the Expression Builder. As usual, you can click a conversion function name in the third column of the Expression Builder, and then click the Help button for more information on the function.

Table 2-3 Main Built-In Conversion Functions

Function	*Acceptable Expression Type*	*Return Type*
`CBool(`*`expression`*`)`	String or number	Boolean
`CByte(`*`expression`*`)`	Number from 0 to 255	Byte
`CCur(`*`expression`*`)`	Number	Currency
`CDate(`*`expression`*`)`	Date/Time	Date
`CDbl(`*`expression`*`)`	Number	Double
`CDec(`*`expression`*`)`	Number	Decimal
`CInt(`*`expression`*`)`	Whole number from -32,768 to 32,767	Integer
`CLng(`*`expression`*`)`	Whole Number	Long
`CSng(`*`expression`*`)`	Number	Single
`CStr(`*`expression`*`)`	Any	String
`CVar(`*`expression`*`)`	Any	Variant

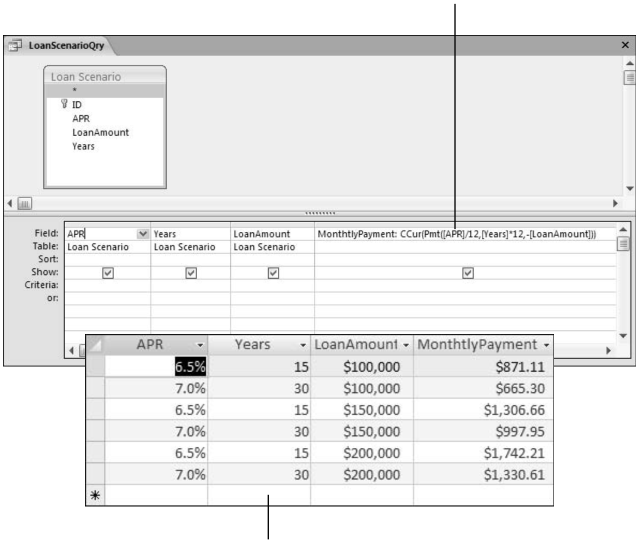
Think of the starting letter *C* in each conversion function's name as standing for "Convert to." For example, `CCur` means "Convert to Currency."

Be careful when you use a conversion function — you're defining the data type, as well as the appearance, of the calculated field. Setting the format of a calculated field in a form or report, rather than directly in the query, is often easier.

The big trick is to enclose the entire expression (everything to the right of the field name and colon) within the conversion function's parentheses in the QBE grid. For example, to display the `MonthlyPayment` field from the sample Loan Scenarios query as Currency data, the entire expression must be contained within the `CCur()` parentheses as the following expression:

```
MonthlyPayment: CCur( Pmt([APR]/12,[Years]*12,-[LoanAmount]) )
```

Figure 2-6 shows the results of using `CCur()` in the `MonthlyPayment` calculated control to display the results of the expression in Currency format.



Field:	APR	Years	LoanAmount	MonthtlyPayment: CCur(Pmt([APR]/12,[Years]*12,-[LoanAmount]))
Table:	Loan Scenario	Loan Scenario	Loan Scenario	
Sort:				
Show:	☑	☑	☑	☑
Criteria:				
or:				

APR	Years	LoanAmount	MonthtlyPayment
6.5%	15	$100,000	$871.11
7.0%	30	$100,000	$665.30
6.5%	15	$150,000	$1,306.66
7.0%	30	$150,000	$997.95
6.5%	15	$200,000	$1,742.21
7.0%	30	$200,000	$1,330.61

Calculated field

Monthly payment in datasheet view

Figure 2-6: Monthly Payment calculations shown in Currency format.

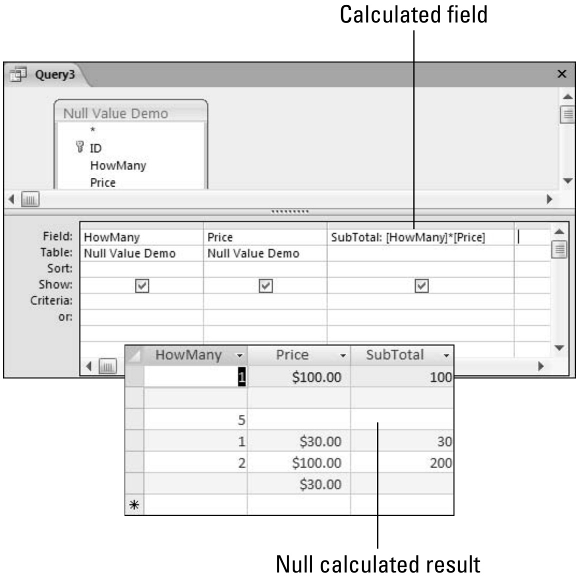
Avoiding problems with null values

Sometimes a field in a record may be empty because nobody ever typed any information into that field. The official name used to describe the value of an empty field is *null*. If a field contains nothing, we say it contains a null value.

Mathematical calculations don't automatically treat a null value as being the same thing as 0 (zero). If any field that's used in a calculated field contains a null, then the expression itself also returns null. In Figure 2-7, the `SubTotal` calculated field multiplies the contents of the `HowMany` field by the `Price` field. In the query results, shown at the bottom of Figure 2-7, any field that has a null in the `HowMany` or `Price` field ends up with a null value in the `SubTotal` field as well.

Use the `Nz()` function to convert a null to a zero. What `Nz()` really means is "if this field contains a null, then make that into a zero, and do the math using that zero." To use the `Nz()` function, put the entire field name within the function's parentheses. In Figure 2-8, the modified calculated field uses the following expression:

```
SubTotal: Nz( [HowMany] ) * Nz( [Price] )
```


Calculated field

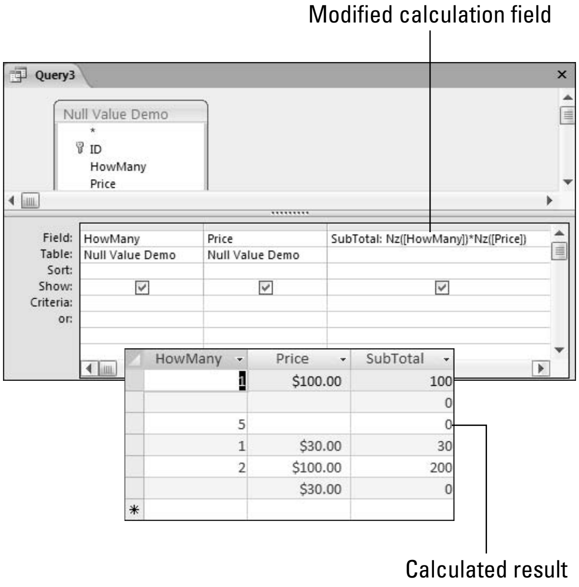
Field:	HowMany	Price	SubTotal: [HowMany]*[Price]
Table:	Null Value Demo	Null Value Demo	
Sort:			
Show:	☑	☑	☑
Criteria:			
or:			

HowMany	Price	SubTotal
1	$100.00	100
5		
1	$30.00	30
2	$100.00	200
	$30.00	
*		

Null calculated result

Figure 2-7: Null fields in a table cause calculations on those fields to be null too.

In the Datasheet view of that same query, shown at the bottom of Figure 2-8, records that contain a null HowMany or Price field yield a zero result, rather than null, in the SubTotal field. That's because the modified calculated control tells Access to use a zero, rather than nothing (a null) to do the math when a field is null.


Modified calculation field

Field:	HowMany	Price	SubTotal: Nz([HowMany])*Nz([Price])
Table:	Null Value Demo	Null Value Demo	
Sort:			
Show:	☑	☑	☑
Criteria:			
or:			

HowMany	Price	SubTotal
1	$100.00	100
		0
5		0
1	$30.00	30
2	$100.00	200
	$30.00	0
*		

Calculated result

Figure 2-8: Nz() function in the calculated control forces Access to use zeroes, rather than nulls, to calculate a result.

TIP

If you want the third column in Figure 2-8 to show results in Currency format ($100.00, $0.00, $0.00, and so forth), enclose the entire expression in a `CCur()` function, such as `SubTotal: CCur( Nz([HowMany]) * Nz([Price]) )`.

You can also use the `IsNull()` function to test for a null field. (See the section "Testing for empty fields," later in this chapter, for more information.)

Date and Time Calculations

The built-in Date and Time functions operate on data stored in Date/Time fields. You can perform some basic calculations, called date arithmetic calculations, on dates using simple + (addition) and – (subtraction) operators. Date arithmetic calculations follow a couple of simple rules:

- **If you subtract two dates, you get a number indicating the number of days between those dates.** For example, `1/15/2007` – `1/1/2007` returns 14, because there are 14 days between January 15 and January 1.
- **If you add a number to, or subtract a number from, a date, you get a new date, rather than a number.** That new date is the date that's *n* number of days away from the original date (where *n* stands for the number of days you add or subtract). For example, `1/1/2007 + 30` returns `1/31/2007` because January 31 is 30 days after January 1. The result of `12/31/2000-999` is `4/7/1998`, because April 7, 1998 is 999 days before 12/31/2000.

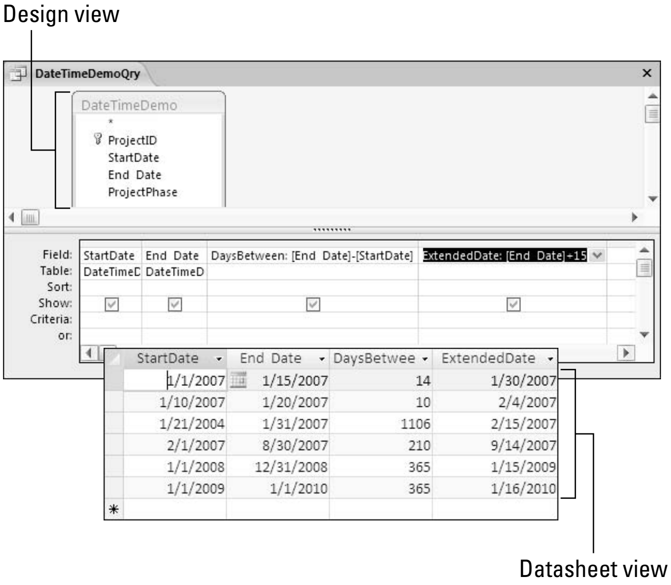
Figure 2-9 shows a sample query that uses some basic arithmetic in query calculated fields. In the underlying table, the `StartDate` and `EndDate` fields are each defined as the Date/Time data type (with the Short Date format). The first calculated field is the following expression:

```
DaysBetween: [EndDate] - [StartDate]
```

and calculates and displays the number of days between the `StartDate` value and the `EndDate` value in each record. The `ExtendedDate` calculated field

```
ExtendedDate: [EndDate] + 15
```

adds 15 days to whatever date is stored in the `EndDate` field. The lower half of Figure 2-9 shows the query results in Datasheet view. The `DaysBetween` column shows the number of days between the `StartDate` value and the `EndDate` value. The `ExtendedDate` column shows the date 15 days after the `EndDate` value, as specified by the expression in the calculated fields.



Field:	StartDate	End Date	DaysBetween: [End Date]-[StartDate]	ExtendedDate: [End Date]+15
Table:	DateTimeD	DateTimeD		
Sort:				
Show:	☑	☑	☑	☑
Criteria:				
or:				

StartDate	End Date	DaysBetwee	ExtendedDate
1/1/2007	1/15/2007	14	1/30/2007
1/10/2007	1/20/2007	10	2/4/2007
1/21/2004	1/31/2007	1106	2/15/2007
2/1/2007	8/30/2007	210	9/14/2007
1/1/2008	12/31/2008	365	1/15/2009
1/1/2009	1/1/2010	365	1/16/2010

Figure 2-9: Sample calculated fields with Date functions in a query in Design view and Datasheet view.

Using literal dates and times in expressions

When writing expressions that include dates, you can use a literal date, as opposed to the name of a field that contains a Date/Time value. A literal date is one that isn't stored in some field — it's just a specific date you want to use in the expression. But you can't just type in the date using an everyday format like 12/31/2005, because Access interprets that as "twelve divided by 31, divided by 2005." And you can't use quotation marks, because those are used to define literal text. Instead, you have to use the awkward # character to *delimit* (surround) a literal date.

For example, `#01/01/2005#` is literally the date January 1, 2005. The expression `#01/01/2005# + 14` returns `1/15/2005`, the date that's 14 days after January 1, 2005. The expression `#3/31/2005# - #1/1/2005#` returns `89`, because March 31, 2005 is 89 days after January 1, 2005.

To express a literal time, use colons (`:`) to separate the hours, minutes, and seconds between the # delimiters. You can also tack on a blank space followed by `AM` or `PM`. For example, `#7:30:00#` is literally `7:30 AM`, as is `#7:30:00 AM#`. The literal time `#7:30:00 PM#` refers to 7:30 at night. You can use military time as well: The literal time `#19:30:00#` is also `7:30 PM`.

Using the Date/Time functions

You're not limited to basic date arithmetic in Access. Quite a few built-in Date/Time functions exist in Access that you can use to manipulate dates and times in other ways. As with all built-in functions, you can find the Date/Time functions in the Expression Builder. Again, if the Functions folder in the left column has a + sign next to it, click that + sign to expand the list. Then click the Built-In Functions subfolder in the left column, and the Date/ Time category in the center column. Then click any function's name from the right column and click the Help button for details on the function.

We spare you the details of every available Date/Time function. Chances are, you may never need to use the more obscure functions. Table 2-4 lists some of the more commonly used Date/Time functions and provides examples of their use.

Table 2-4 Examples of Access Date/Time Functions

Function and Syntax	*Returns*	*Example*
`Date()`	The current date.	Returns the current date, according to your computer's clock.
`Time()`	The current time.	Returns the current time, according to your computer's clock.
`Now()`	The current date and time.	Returns the current date and time, according to your computer's clock.
`CDate(`*`expression`*`)`	Converts *`expression`*, which can be any string that looks like a date, to an actual `Date/Time` value.	`CDate("Mar 31, 2004)` returns `3/31/2004`.
`DateAdd(`*`interval`*`, `*`number`*`, `*`date`*`)`	The date that is *`number`* of days, weeks, months (*`interval`*) from *`date`*.	`DateAdd("m",14,#1/1/2004#)` returns `3/1/2005`, the date that's 14 months after January 1, 2004.
`DateDiff(`*`interval`*`, `*`date1`*`, `*`date2`*` [,`*`firstdayofweek`*` [,`*`firstweekofyear`*`]])`	The number of hours, days, weeks, (*`interval`*) between two dates.	`DateDiff("w",#1/1/2004#,#1/1/2005#)` returns `52` because there are 52 weeks between the two dates.
`Day(`*`date`*`)`	The day of the month expressed as a number between 1 and 31.	`Day(#1/15/2004#)` returns `15` because 1/15/2004 falls on the 15th day of the month.

Function and Syntax	*Returns*	*Example*
`Hour(`*`time`*`)`	The hour of a time.	`Hour(Now())` returns a number representing the current hour of the day.

`MonthName`
`(`*`monthNumber`*
`[,`*`abbreviate`*`])`
	The month of a date, spelled out (if *`abbreviate`* is false) or abbreviated (if*`abbreviate`* is true).	`MonthName(12.False)` returns `December`, `MonthName(12,True)` returns `Dec` (because December is the 12th month of the year).

As you can see in Table 2-4, the `DateAdd()` and `DateDiff()` functions allow you to specify an *interval* argument. That argument defines the time interval used for the calculation.

For example, if you just use plain date arithmetic to subtract two dates, the difference between the dates automatically displays as the number of *days* between those dates. Using the `DateAdd()` or `DateDiff()` function, you can change that so the difference between the dates is expressed in seconds, minutes, hours, weeks, months, or years — depending on which provides the accuracy you need.

To specify a time interval argument in a `DateAdd()` or `DateDiff()` function, you use one of the settings (enclosed in quotation marks) listed in the left column of Table 2-5.

Table 2-5 Settings for the *Interval* Argument in Date/Time Functions that Require an Interval

Setting	*Description*
`"d"`	Day
`"h"`	Hour
`"m"`	Month
`"n"`	Minute
`"q"`	Quarter
`"s"`	Second
`"w"`	Weekday
`"ww"`	Week
`"y"`	Day of year
`"yyyy"`	Year

Take a look at an example using an interval in a DateDiff() function. Without using the DateDiff() function at all, the expression #12/25/2007# - #12/24/2007# returns 1, because there is one day between those dates, and "day" is the default interval when subtracting dates. On the other hand, the expression DateDiff("h",#12/24/2007#,#12/25/2007#) returns 24, because the "h" interval specifies hours, and there are 24 hours between those two dates.

Manipulating Text with Expressions

You can use the contents of Text fields (also called *strings,* short for "a string of characters") in expressions as well. Only adding, subtracting, multiplying, or dividing with strings doesn't make sense. After all Smith times Jones or Smith divided by Jones makes no sense at all. However, you can use the ampersand (&) operator to concatenate (join together) strings.

For example, the expression [First Name] & [Last Name] joins together the contents of the Last Name and First Name fields. If the Last Name field contains Pines, and the First Name field contains Tori, then the expression [First Name] & [Last Name] returns ToriPines.

Adding spaces to text expressions

"But wait," you say, "shouldn't that be *Tori Pines* with a space in between?" To you and me it should be. But that's not what the expression says. The expression says "stick the First Name value and Last Name value together." The expression doesn't say "and put a space between them." Computers are literal-minded; you can easily fix the problem by using literal text.

Literal text is any text that doesn't refer to a field name or function or anything else that has special meaning to Access. To use literal text in a calculated field expression, enclose the text in quotation marks. A blank space is a character — a chunk of literal text. So watch what happens if we rewrite the previous example expression like this:

```
[First Name] & " " & [Last Name]
```

The result is Tori Pines with a space in between. The expression says "the contents of the First Name field, followed by a blank space, followed by the contents of the Last Name field."

Two quotation marks right next to each other, with no blank space in between, is a zero-length string, which is basically nothing at all. So while `[First Name] & " " & [Last Name]` returns something like `Tori Pines`, the expression `[First Name] & "" & [Last Name]` returns something like `ToriPines` (the first and last names with nothing in between).

Suppose a table contains `City`, `State`, and `ZIP` fields. The following expression displays the city name followed by a comma and a blank space, followed by the state name, followed by two blank spaces, followed by the ZIP code:

```
 [City] & ", " & [State] & "  " & [ZIP]
```

An example of the preceding expression may look something like this:

```
Los Angeles, CA  91234
```

Using the Access Text functions

Access provides several functions for working with text. You find them in the Text category in the middle column of the Expression Builder. We focus on some of the more commonly used functions and show examples of their usage. For information on more Text functions and additional details, use the Help button in the Expression Builder. Table 2-6 lists the more common Text functions.

Table 2-6 Examples of Built-in Text Functions

Function and Syntax	*Returns*	*Example*
`LCase(`*`string`*`)`	*`string`* converted to lowercase	`LCase("AbCdEfG")` returns `abcdefg`
`UCase(`*`string`*`)`	*`string`* converted to uppercase	`UCase("AbCdEfG")` returns `ABCDEFG`
`Left(`*`string`*`,`*`n`*`)`	Leftmost *`n`* characters of *`string`*	`Left("abcdefg",3)` returns `abc`
`Right(`*`string`*`,`*`n`*`)`	Rightmost *`n`* characters of *`string`*	`Right("abcdefg",2)` returns `fg`
`Mid(`*`string`*`, `*`start`*`[, `*`length`*`])`	Middle *length* characters of string starting at *start*	`Mid("abcmnyz",4,2)` returns `mn`
`Len(`*`string`*`)`	Length of *`string`*	`Len("Howdy")` returns `5`
`Trim(`*`string`*`)`	*`string`* with any leading and trailing spaces trimmed off	`Trim(" abc ")` returns `abc`
`InStr([`*`start`*`,] `*`string1`*`, `*`string2`*`)`	Position of *`string2`* in *`string1`* starting at *`start`*	`InStr("abcxdef","x")` returns `4` (because `x` is the fourth character in *`string1`*)

Writing Decision-Making Expressions

One of the most useful functions in Access is the Immediate If function, `iif()`, which accepts three arguments, as the following shows:

```
iif(conditionalExpression, doThis, elseDoThis)
```

where:

- *`conditionalExpression`* is an expression that results in a `True` or `False` value.
- *`doThis`* is what the function returns if the *`conditionalExpression`* proves `True`.
- *`elseDoThis`* is what the function returns if the *`conditionalExpression`* proves `False`.

The value of the `iif()` function lies in its ability to make a decision about what to return based on the current situation. For example, suppose your business requires charging 7.25% sales tax to New York residents and no sales tax to everyone else. The `State` field in the underlying table contains the state to which the order is shipped. The following expression says, "If the `State` field contains `NY`, then return `0.7.25%`, otherwise return `0` (zero)":

```
iif([State]="NY", 0.0725, 0)
```

Note, in the preceding expression, that `0.0725` is just a way of expressing 7.25% as a regular decimal number (remove the `%` sign and shift the decimal point two places to the left).

Another example of an `iif()` function is where a `Paid` field in a table is a `Yes/No` field. A `Yes/No` field can only contain either a `True` or `False` value. The field name alone is a sufficient conditional expression for an `iif()` function, as in the following sample expression:

```
iif([Paid], "Receipt", "Invoice")
```

In English, the expression says, "If the `Paid` field contains `True` (or `Yes`), return the word `Receipt`. Otherwise (if the `Paid` field contains `False`) return the word `Invoice`."

Making comparisons in iif()

Access offers several *comparison operators* that you can use to define expressions that result in the True or False values. Buttons for these operators appear alongside the arithmetic operators in the Expression Builder. Table 2-7 describes the Access comparison operators.

Table 2-7 Built-in Comparison Operators

Comparison Operator	*Name*	*Meaning*
=	Equals	is equal to
>	Greater than	is greater than
>=	Greater than or equal to	is greater than or equal to
<	Less than	is less than
<=	Less than or equal to	is less than or equal to
<>	Not equal to	is not equal to
Between	Between	is within the range of

An example of an iif() function — using the >= comparison operator to make a decision based on the contents of a field named Qty — is the following:

```
iif([Qty]>=10, "Discount", "No discount")
```

In English, the expression says, "If the Qty field contains a value greater than or equal to 10, then return Discount. Otherwise return No Discount."

Combining comparisons

You can use the Access built-in *logical operators* to combine several comparisons into a single expression that results in a True or False value. The logical operators are listed in Table 2-8.

Table 2-8 Built-in Logical Operators

Logical Operator	*Meaning*
And	Both conditions are True.
Or	One, or both, conditions are True.
Xor	Exclusive "or" — one condition, but not both conditions, are True.
Not	Not True.

As an example, take a look at the following iif() function which uses the And operator:

```
iif([Last Name]="Pines" And [First Name]="Tori","No Charge","Charge")
```

The conditional expression, [Last Name]="Pines" And [First Name]="Tori" says, "If the Last Name field contains Pines and the First Name field contains Tori." So one condition is that the Last Name field contain Pines. The other condition is that the First Name field contain Tori. If both those conditions are True, the expression returns No Charge. If either one, or both, of those conditions is False, then the expression returns Charge.

Another example using the Or operator is the following expression:

```
iif([State]="NY" Or [State]="NJ", "Tax", "No Tax")
```

In the preceding example, the first condition is that the State field contain NY. The second condition is that the State field contain NJ. The Or operator says that either one (or both) of the conditions must be met for the whole conditional expression to return True. If the State field contains NY or NJ, the expression returns Tax. If the State field contains anything other than NY or NJ, then the expression returns No Tax.

To tax or not to tax?

A practical example of using an iif() function in calculated field expressions is whether to tax. Suppose you have a query like the one in Figure 2-10. Your business requires that you charge 7.25% tax to all orders shipped within the state of New York. You charge no sales tax on orders shipped outside of New York. The StateProv field in the query contains the state to which the order is shipped.

Obviously, you can't see all the expressions in the query — the QBE grid isn't wide enough to show all that. The following is a quick summary of what each field in the query represents:

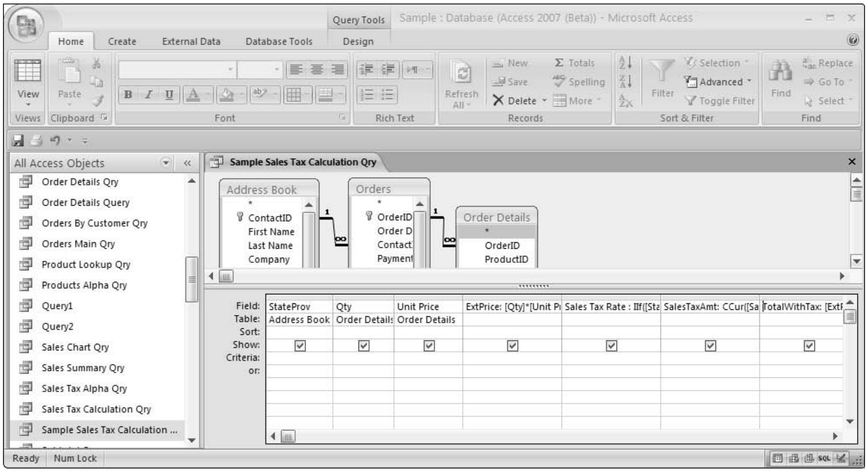
- StateProv: A regular Text field from the underlying Address Book table, representing the state to which the order is being shipped.
- Qty: A regular Number field from the Order Details table, representing the quantity of items ordered.
- Unit Price: A regular Currency field from the Order Details table, representing the unit price of the item ordered.

✦ `ExtPrice`: A calculated field, `ExtPrice:[Qty]*[Unit Price]`, that multiplies the contents of the `Qty` field by the contents of the `Unit Price` field.

✦ `Sales Tax Rate`: A calculated field, `SalesTaxRate:iif ([StateProv]="NY",0.0725,0)`, meaning “If the `StateProv` field contains `NY`, then put `0.0725` into this field. Otherwise put `0` (zero) into this field.”

✦ `SalesTaxAmt`: A calculated field, `SalesTaxAmt:CCur ([SalesTaxRate]*[ExtPrice])`, that multiplies the extended price by the sales tax rate. The `CCur()` function makes the result appear in Currency format, rather than as a General number.

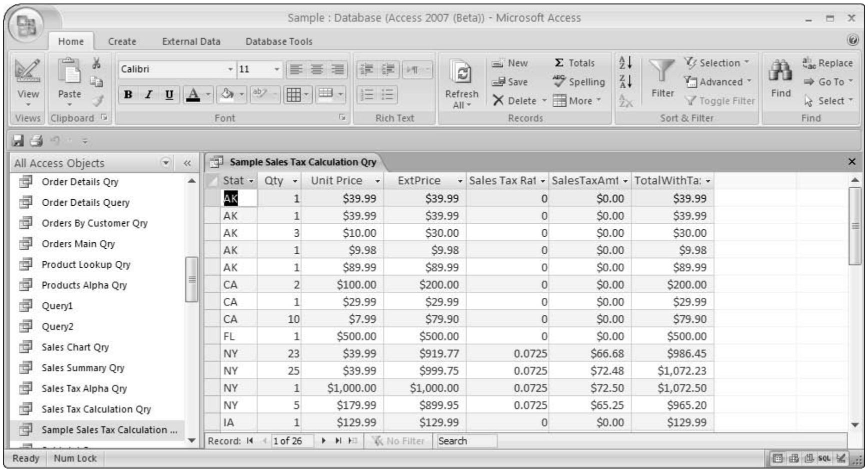
✦ `TotalWithTax`: A calculated field, `TotalWithTax: [ExtPrice] + [SalesTaxAmt]`, that adds the extended price to the sales tax amount.



Field:	StateProv	Qty	Unit Price	ExtPrice: [Qty]*[Unit Pı	Sales Tax Rate : IIf([Sta	SalesTaxAmt: CCur([Sa	TotalWithTax: [ExtP
Table:	Address Book	Order Details	Order Details				
Sort:							
Show:	☑	☑	☑	☑	☑	☑	☑
Criteria:							
or:							

Figure 2-10: Query containing regular and calculated fields (calculated fields are partially hidden).

Figure 2-11 shows the results of the query. Records that have `NY` in the `StateProv` field show a sales tax rate of 7.25% (`0.0725`). Records that don’t have `NY` in the `StateProv` field show `0` (zero) as the sales tax rate. The `SalesTaxAmt` and `TotalWithTax` fields show the results of adding sales tax. (Because the `SalesTaxRate` value is zero outside of `NY`, those records end up getting no sales tax added to them.)



Stat	Qty	Unit Price	ExtPrice	Sales Tax Rat	SalesTaxAmt	TotalWithTa:
AK	1	$39.99	$39.99	0	$0.00	$39.99
AK	1	$39.99	$39.99	0	$0.00	$39.99
AK	3	$10.00	$30.00	0	$0.00	$30.00
AK	1	$9.98	$9.98	0	$0.00	$9.98
AK	1	$89.99	$89.99	0	$0.00	$89.99
CA	2	$100.00	$200.00	0	$0.00	$200.00
CA	1	$29.99	$29.99	0	$0.00	$29.99
CA	10	$7.99	$79.90	0	$0.00	$79.90
FL	1	$500.00	$500.00	0	$0.00	$500.00
NY	23	$39.99	$919.77	0.0725	$66.68	$986.45
NY	25	$39.99	$999.75	0.0725	$72.48	$1,072.23
NY	1	$1,000.00	$1,000.00	0.0725	$72.50	$1,072.50
NY	5	$179.99	$899.95	0.0725	$65.25	$965.20
IA	1	$129.99	$129.99	0	$0.00	$129.99

Figure 2-11: Results (Datasheet view) of the query shown in Figure 2-10.

Testing for Empty Fields

Sometimes having an expression know if a field is empty, or null, is useful. Access includes an `IsNull()` function that you can use to test if a field is empty. The syntax of the function is pretty straightforward:

```
IsNull[fieldname])
```

where *`fieldname`* is the name of the field you want to test.

If the specified field is empty, `IsNull()` returns a `True` value. If the specified field isn't empty, then `IsNull()` returns a `False` value. The next section provides an example of using `IsNull()` in an expression.

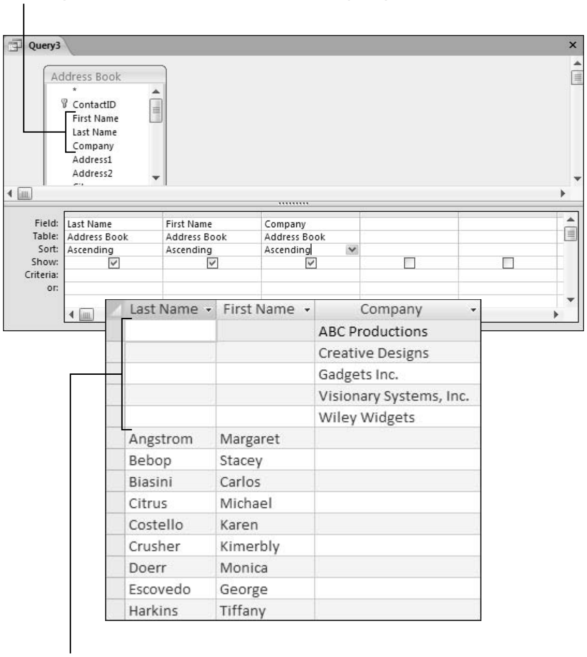
TIP

To treat a null field as a zero in mathematical expressions, use the `Nz()` function described in the section, "Avoiding problems with null values," earlier in this chapter.

Sort by name or company

A fairly common problem comes up in tables that store names and addresses. Some records in such a table may list a person's name, but no company name. Some records may contain a company name, but no person name. If you sort records in such a table by the `Last Name`, `First Name`, and `Company` fields, as in Figure 2-12, the records with empty `Last Name` and `First Name` fields are listed first.

Sort by Last Name, First Name, Company fields



Field:	Last Name	First Name	Company		
Table:	Address Book	Address Book	Address Book		
Sort:	Ascending	Ascending	Ascending		
Show:	☑	☑	☑	□	□
Criteria:					
or:					

Last Name	First Name	Company
		ABC Productions
		Creative Designs
		Gadgets Inc.
		Visionary Systems, Inc.
		Wiley Widgets
Angstrom	Margaret	
Bebop	Stacey	
Biasini	Carlos	
Citrus	Michael	
Costello	Karen	
Crusher	Kimerbly	
Doerr	Monica	
Escovedo	George	
Harkins	Tiffany	

In query results (Datasheet view), records with null Last Name fields are listed first.

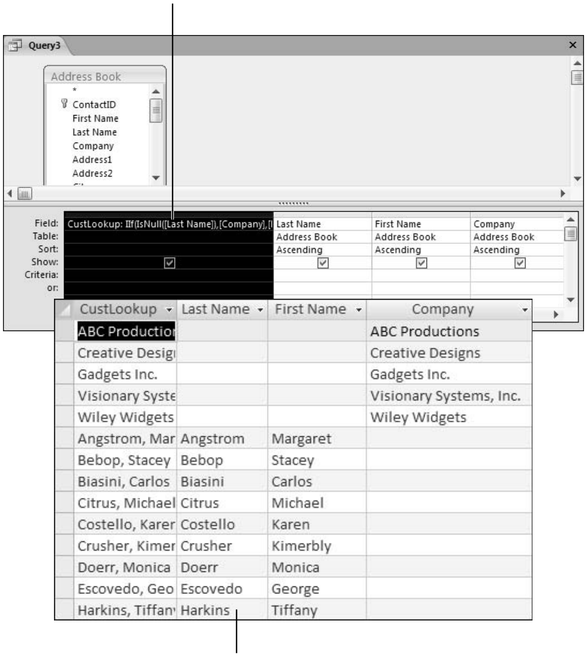
Figure 2-12: Sorting by name and company fields puts empty name fields at the top.

Suppose you would prefer to see names listed in alphabetical order by person name — or by company name if there is no person name. In that case, create a calculated field in Design view. You can name this field anything you want, but in Figure 2-13, we named the field `CustLookup`. The expression for that field reads:

```
CustLookup: iif(IsNull([Last Name]),[Company],[Last Name] & ", " & [First Name])
```

The `iif()` expression says, "If the `Last Name` field is null, put the company name in this field. Otherwise, put the person's last name followed by a comma, space, and the person's first name (for example, `Pines, Tori`) into this field." Setting the Sort row for that calculated field to Ascending order puts records into alphabetical order by last name or company (if there is no last name), as shown in Figure 2-13.

Calculated field



Field:	CustLookup: IIf(IsNull([Last Name]),[Company],[I	Last Name	First Name	Company
Table:		Address Book	Address Book	Address Book
Sort:		Ascending	Ascending	Ascending
Show:	☑	☑	☑	☑
Criteria:				
or:				

CustLookup	Last Name	First Name	Company
ABC Productio			ABC Productions
Creative Desig			Creative Designs
Gadgets Inc.			Gadgets Inc.
Visionary Syste			Visionary Systems, Inc.
Wiley Widgets			Wiley Widgets
Angstrom, Mar	Angstrom	Margaret	
Bebop, Stacey	Bebop	Stacey	
Biasini, Carlos	Biasini	Carlos	
Citrus, Michael	Citrus	Michael	
Costello, Karer	Costello	Karen	
Crusher, Kimer	Crusher	Kimerbly	
Doerr, Monica	Doerr	Monica	
Escovedo, Geo	Escovedo	George	
Harkins, Tiffan	Harkins	Tiffany	

Alphabetized by name or company

Figure 2-13: Sorting by calculated field sorts by name, or company if last name is blank.

Creating Flexible Parameter Queries

A *parameter query* is a query intentionally missing a piece of needed information, so that you can enter the information on the fly when you open the query in Datasheet view. For example, suppose you create a query that shows orders from all records in a table (or tables) from all records in your database. You also like to have queries that show orders from each month.

Rather than create 12 different queries (one for each month), you can create a parameter query that asks for the month number. Then, as soon as you enter a month number, the query shows orders for just the month you specified. In other words, the month number that you're interested in becomes a parameter that you define and pass (provide) to the query just before the query opens.

To create a parameter query, start by creating just a normal select query (as detailed in the previous chapter). You can add tables and field names just as you would any other query. Then follow these steps to make your query into a parameter query:

1. **In the Design View window, click Parameters in the Show/Hide group of the Design tab on the Ribbon.**

   The Query Parameters dialog box appears.

2. **Enter a parameter name and its Data Type in the appropriate columns.**

   The parameter name can be any name you like, so long as it doesn't match the name of a regular field or calculated field already included in the table. The data type matches the type of data that the parameter will ask for, such as Text for text, Currency for a dollar value, or Date/Time for a date or time. You can repeat this step to create as many parameters as you wish.

3. **Click OK to close the Query Parameters dialog box.**

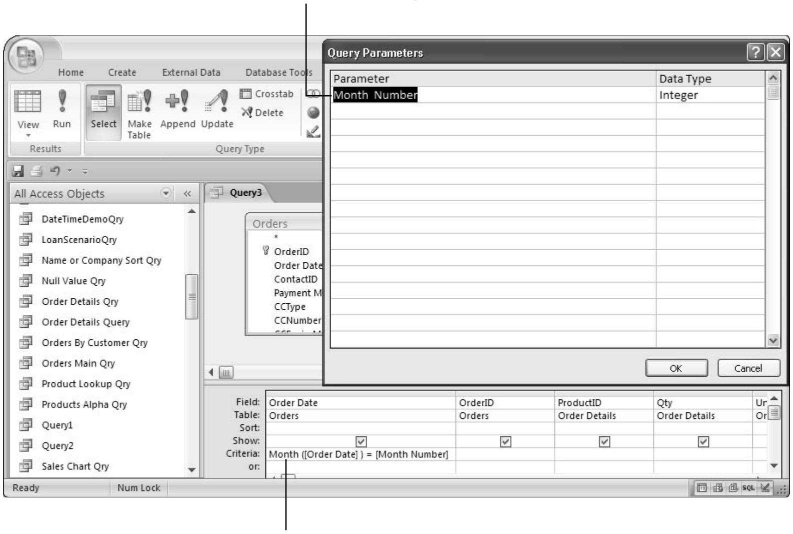
TIP

In the QBE grid, you can then treat the parameter name as you do a value from a field. In fact, you enclose the parameter's name in square brackets, just as you would a field name.

In Figure 2-14, we created a `Month Number` parameter that contains an integer. In the Criteria row for the `Order Date` field in the QBE grid, we used the parameter name in the following expression, as shown in Figure 2-14. The criterion tells the query to show only those records where the month of the order date is equal to whatever we type in as the `Month Number` parameter.

```
Month([Order Date]) = [Month Number]
```

Month number parameter defined



Parameter	Data Type
Month Number	Integer

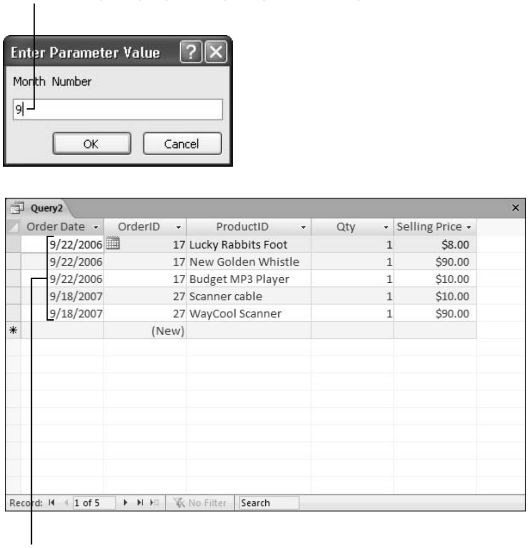
Field:	Order Date	OrderID	ProductID	Qty	Ur
Table:	Orders	Orders	Order Details	Order Details	Or
Sort:					
Show:	☑	☑	☑	☑	
Criteria:	Month ([Order Date]) = [Month Number]				
or:					

Month number used in criteria

Figure 2-14: Defining and using a query parameter.

After defining your parameter and using it in the QBE grid, you can save the query as you do any other query. The parameter doesn't really come into play until you open the query in Datasheet view. When you do, an Enter Parameter Value dialog box, like the one shown near the top of Figure 2-15, opens on-screen. You type in a value for the parameter and click OK. For the sake of our example, say you type **9** to view September orders only.

Before a query opens, you provide a parameter value.



Enter Parameter Value

Month Number

9

Order Date	OrderID	ProductID	Qty	Selling Price
9/22/2006	17	Lucky Rabbits Foot	1	$8.00
9/22/2006	17	New Golden Whistle	1	$90.00
9/22/2006	17	Budget MP3 Player	1	$10.00
9/18/2007	27	Scanner cable	1	$10.00
9/18/2007	27	WayCool Scanner	1	$90.00
	(New)			

Figure 2-15: The result of opening a parameter query and specifying 9 as the Month Number.

The opened query shows orders only for September (month 9)

When you click the OK button in the Enter Parameter Value dialog box, the query opens in Datasheet view, using the parameter value you specified. In this example, the query shows only records that have `9` as the month number in the `Order Date` field, as shown in the bottom half of Figure 2-15.

TIP

You will also see the Enter Parameter Value dialog box if you have a typo or another error where Access doesn't recognize a field name in your query design.

Totals, Subtotals, Averages, and Such

So far, all the calculations in our queries operate on individual fields within records. Suppose you want a different sort of total — such as the total dollar amount of all sales, in all records? You can perform such calculations in two ways. The best — and perhaps easiest — way is to use a report rather than a query. Reports provide more flexibility, and allow you to display the information in more meaningful ways than queries do.

For the goods on creating reports with totals and subtotals, see Book V, Chapter 1.

The other approach is to use a *totals query*. A totals query doesn't give you the flexibility or pretty output that a report does. But a totals query is useful when you just want to perform some quick calculations on the fly without formatting a fancy report.

If you just want to do some quick subtotals, totals, or other multirecord calculations — and don't really care how the data looks on-screen or in print — you can use a query to do the math. As to the other multirecord calculations we just mentioned, Table 2-9 lists all the calculations you can do in a totals query.

Table 2-9 Operations Available in a Totals Query

Choice	*Returns*
`Avg`	Average of records in field
`Count`	How many records
`First`	Value stored in first record
`Group by`	Nothing — this is used only for grouping
`Last`	Value stored in last record
`Max`	Highest value in all records
`Min`	Lowest value in all records
`StDev`	Standard deviation
`Sum`	Sum of records in field
`Var`	Variance

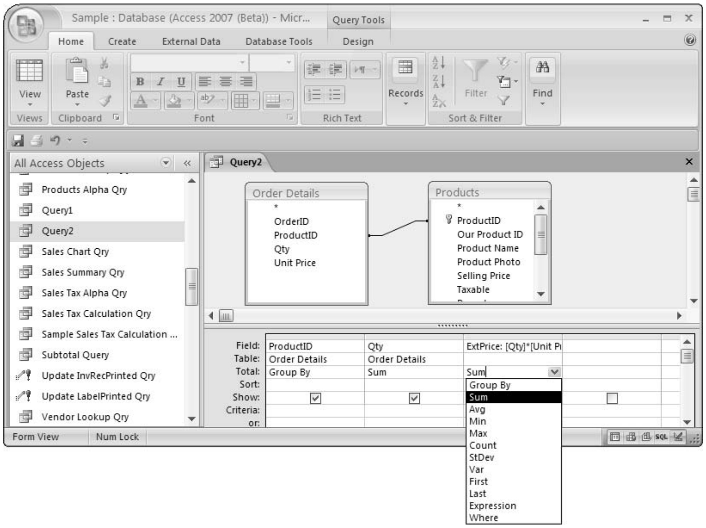
To create a query that performs calculations on multiple records, start with a normal select query that contains the table (or tables) on which you want to perform calculations. Then do either one of the following:

Σ Totals

- Click the Totals button in the Show/Hide group of the Design tab on the Ribbon.
- Right-click the query grid and choose Totals from the shortcut menu.

The only change you see is a new row, titled Total, in the QBE grid. The next step is to drag any field name on which you want to perform math down to the Field row of the grid. Optionally, you can create a calculated field and then perform a calculation on that value.

After the field is in place, click the Total row, and then choose an option from the drop-down list, as shown in Figure 2-16. Repeat this process for each field on which you want to perform a calculation.



Field:	ProductID	Qty	ExtPrice: [Qty]*[Unit Pr	
Table:	Order Details	Order Details		
Total:	Group By	Sum	Sum	
Sort:				
Show:	☑	☑		☐
Criteria:				
or:				

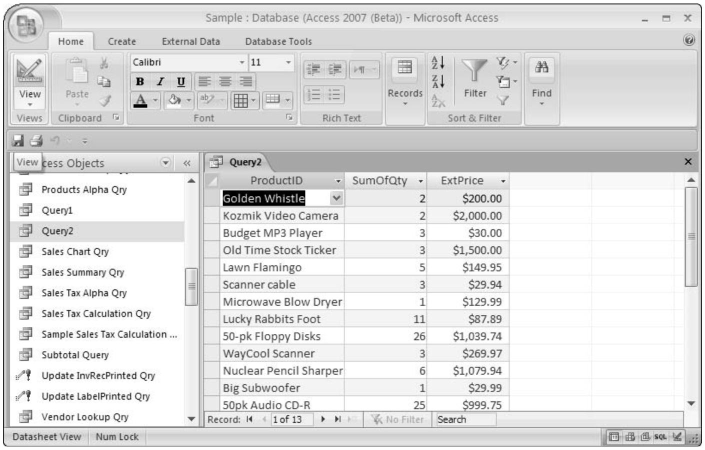
Figure 2-16: The Total row in a Totals query allows you to pick a calculation.

When you switch to Datasheet view to see the results of the query, don't be shocked if your large table, which consists of many records, is suddenly reduced to many fewer records. No, you didn't make an error — Totals queries work this way. The query shown in Figure 2-17 results in a datasheet that has one record for each product sold. The `SumOfQty` field is created automatically by the Totals query (using the `Qty` field that we included in the query.) The `ExtPrice` field lists the net income for each product.

To see a single value, the total income for all products, delete the `ProductID` field from the query design.

Calculating subtotals in a query

To calculate subtotals, use another field in the query that identifies the field the subtotals should be based on. Set the Total row for that field to a `Group By` value. In the top half of Figure 2-16, we added the `ProductID` field from the Order Details table to the QBE grid and set its Total row to a `Group By` value.



ProductID	SumOfQty	ExtPrice
Golden Whistle	2	$200.00
Kozmik Video Camera	2	$2,000.00
Budget MP3 Player	3	$30.00
Old Time Stock Ticker	3	$1,500.00
Lawn Flamingo	5	$149.95
Scanner cable	3	$29.94
Microwave Blow Dryer	1	$129.99
Lucky Rabbits Foot	11	$87.89
50-pk Floppy Disks	26	$1,039.74
WayCool Scanner	3	$269.97
Nuclear Pencil Sharper	6	$1,079.94
Big Subwoofer	1	$29.99
50pk Audio CD-R	25	$999.75

Figure 2-17: The query design shown in Figure 2-16 produces this datasheet, with one line for each ProductID (the `Group By` field).

The bottom half of Figure 2-17 shows the results of that query in Datasheet view. We get the total extended price of orders for each individual product. The totals group by product. So we sold $200.00 worth of Golden Whistles, $2000.00 worth of Kozmik Video Cameras, and so forth.

TIP

The results of a totals query aren't always easy to interpret. Alas, the small amount of detail in the query results can make it difficult to see what the calculated values are based on. The lack of detail in queries is, in fact, the most important reason that reports are so much better than queries for totals and subtotals. In a report, you can include all the details you want — and arrange things in such a way that you can easily grasp the meaning of every calculated total just by looking at the report.

Filtering records based on calculated fields

You can filter records based on the results of a calculated field. Suppose you want to do a query like the one in Figure 2-16, but you only want to see records where the total extended price is greater than or equal to $1,000. In that case, just set the Criteria row for the calculated field to `>=1000`. In the Datasheet view, only those products with sales totals results greater than or equal to $1,000 show up on-screen.

Chapter 3: Doing Neat Things with Action Queries and Query Wizards

In This Chapter

- **Using action queries safely**
- **Using update queries to change data into tables**
- **Creating new tables with make-table queries**
- **Adding data from one table to another table with append queries**
- **Gathering stray sheep with the Find Unmatched Wizard**
- **Getting the hang of the Find Duplicates Wizard**

Chapter 1 of this minibook concentrates on creating select queries, which are the most common type of query created by Access users. You may not realize, though, that Access has other types of queries. Use action queries to make changes to your data — for example, you can set up a query to make a change to all the records that match a criterion. And two query wizards — the Find Duplicates Query Wizard and the Find Unmatched Query Wizard can help you clean up the data in your database.

Creating Action Queries

Action queries are a way to make global corrections to your database. They are very powerful — which means they can be tremendously useful and save you a lot of time. They can also make an enormous mess of your database if used incorrectly.

Action queries differ significantly from select queries. A select query shows you data that meet your criteria; an action query looks for the data that meets your criteria, and then does something with it, such as making changes to the data or moving records to a new table.

Four kinds of action queries, corresponding to four very specific tasks, exist. You may find that creating an action query saves you tons of time if you want to do any of the following things:

- Delete some records *(delete query)*
- Copy data from one table to another table *(append query)*

- Update (change) information in some records *(update query)*
- Create a new table from data stored in other tables *(make-table query)*

TIP

Make a backup *before* you run an action query. Action queries can make huge changes to your database — and even if you're careful, you may make a mistake. Making a backup doesn't take much time, especially compared to the time spent fixing what an action query did. You may want to back up the whole database or just the tables affected by the query. (To find out about making copies of a database object, see Book I, Chapter 2; to find out about backing up a database, see Book VII, Chapter 1.)

The usual way to create a query is to click the Query Wizard or Query Design button on the Create tab of the Ribbon. When you create a query using either of these methods, Access automatically creates a select query. You can change the query type of any query, whether it's brand new or well used. To change the query type, choose the type of query you want from the Query Type group of the Design tab on the Ribbon (when the query is shown in Design view). (You can choose Make Table, Append, Update, or Delete Query to create an action query.)

The dangers of the Run button

As you may realize by now, action queries make changes; they don't just display data. You need to know how to safely create an action query without running it before you finish defining exactly how you want the query to work. The key is in when you use the View and Run buttons, and how you open the query:

- When you work with a select query, the View and Run buttons do the same thing.
- When you work with an action query, the View and Run buttons do completely different jobs:

View

- The View button displays Datasheet view with all the records that match your selection criteria, which is a good way to preview what records will change when you run the action query. The View button is a safe way to look at the datasheet of an action query to see whether the query will work the way you want it to.

Run

- The Run button executes the action — deletes or changes data in your database. You cannot undo the action after you click the Run button in an action query, so be very sure you set up the query correctly before you run it — and be sure to have backups of the affected tables just in case disaster strikes. (To find out about making copies of a database object, see Book I, Chapter 2.)

You also need to be careful how you open an action query. Action queries are always rarin' to go. When you open an action query from the Database window by double-clicking the query name, or by selecting it and clicking the Open button, you tell Access to *run* the query (not just to show it). Access warns you that you are about to run an action query that changes the database by updating records, deleting records, or whatever and gives you a chance to change your mind. If all you want to do is work on the design, be sure to right-click the query and choose Design view from the shortcut menu.

Recognizing action queries in the Navigation Pane is easy because their icons are a little different from the icons that select queries have — all action-query icons have an exclamation point.

By default, Access disables all action queries unless your database resides in a trusted location, or unless the database itself is signed and trusted.

It is possible that when you try to run an action query, nothing will happen except a message in the message bar or status bar that reads `This action or event has been blocked by Disabled Mode.` This is the easiest way to persuade Access to run an action query, as follows:

1. **If you don't see the message bar, display it by selecting the Message Bar check box in the Show/Hide group of the Database Tools tab of the Ribbon.**

   The message bar appears under the Ribbon.

2. **Click the Options button on the message bar to display the Microsoft Office Security Options dialog box.**
3. **Click Enable This Content to allow macros, code, and action queries to run.**

   The change only lasts until you close the database. The next time you open the database, you'll have to repeat these steps.

After you click the Options button, the Message Bar option on the Database Tools tab is disabled. It will be enabled the next time you open the database.

Creating action queries safely

You need to perfect an action query before you run it so that you don't wreck your data. (Of course, if you make a mistake you have a backup — right?) You make it, look at it, maybe test it on a few records in a test table, and then finally run it.

The process for creating an action query is as follows:

1. **Back up your database, or make copies of the tables that the action query will change.**

   Because action queries can do so much work (good or bad), make a backup before you run the query.

2. **Create the query as a select query.**

   In the Database window, click the Queries button and click one of the wizard icons. Add tables (or queries) and fields to the design grid. Define criteria and sort order as needed.

   The point is to create a query that displays the records that the action query acts on.

3. **View the records that the query will act on by clicking the View button.**

   You see the records that the query will act on. Make sure you see the data you need.

4. **Use the Query Type buttons to choose the type of action query you need — Make Table, Update, Append, or Delete.**

5. **Add the information about what you want the query to do — update data, append data, make a table, or delete data.**

   The details are covered in the following sections on each type of query.

   You may want to use the View button again to see the records the query will act on.

6. **Click the Run button to run the query.**

   Access warns you that you are about to make changes that you can't undo.

   If you see a message that the action has been blocked, refer to the steps at the end of the previous section.

7. **Click the Yes button to run the query.**

   Access runs the query.

8. **Check your results.**

   Checking the results in the underlying tables is a good idea. If the action query acts on a field that you use in a criterion, you may not see the records that change after the query has run — you may have to look at the table, or create a new query to view the results.

   The append and make-table queries create new tables. View those results in the affected tables, and not in the query datasheet.

9. **If you won't be using the action query again, delete it.**

   They are dangerous things to have lying around!

TIP

After you add an action query, each time you open your database you see a security warning telling you that certain content in the database has been disabled.. Unless you suspect a virus may actually exist, you can click Options and then click Enable this Content.

Changing Data with Update Queries

You can use an *update query* to change a pile of data at the same time — to raise prices by 10 percent, for example, or to replace a product number with a new product number.

For instance, you may create a query to find orders that haven't yet been shipped that include a Golden Whistle, an item that is discontinued but has a substitute. You could then use the update query to change the item number in records that meet those criteria to `New Golden Whistle`, the replacement item.

Using the update query when you work on lots and lots of data or when you want to update multiple fields makes sense. But before you delve into the complexities of an action query, consider whether you can use the much simpler Find and Replace dialog box to find and replace data instead. (See Book II, Chapter 2 for more information on the Find and Replace dialog box.) You can use the Find and Replace dialog box in a datasheet created by a query; if you change the data in the query, the table holding the underlying data reflects the change.

To create an update query, follow these steps:

1. **Back up the database and/or make copies of the tables that will be affected by the update.**

   Update queries can be hard to get right, so play it safe in case you need to get your data back the way it was before you ran the update query.

2. **Create a new select query in Design view.**

   See Chapter 1 of this minibook for more information on creating a query.

   Include tables that you plan to update or for which you need to use fields to establish the update criteria.

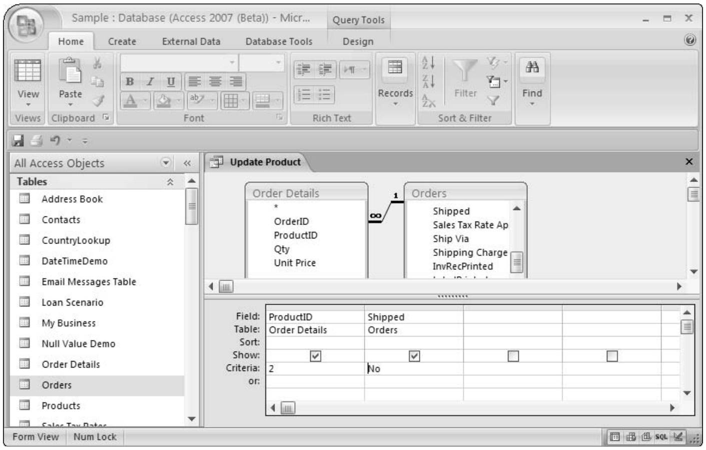
3. **Put fields in the design grid.**

   Add the fields you want to see in the datasheet, the fields you want to use with criteria to tell Access exactly what to update, and the fields you want to change by using the update query.

   See Chapter 1 of this minibook for more on using the design grid.

4. **Add the criteria to tell Access how to choose the records you want to update.**

   Figure 3-1 shows the select query that finds all unshipped orders for the Golden Whistle. You see two fields included in the query — the `Shipped` field, because we are looking for orders that haven't been shipped (this is a Yes/No field, and we are looking for `No` values), and the `Product ID` field, because we are looking for orders that contain the Golden Whistle product.



Field:	ProductID	Shipped		
Table:	Order Details	Orders		
Sort:				
Show:	☑	☑	□	□
Criteria:	2	No		
or:				

Figure 3-1: This select query finds all orders for the Golden Whistle that haven't shipped.

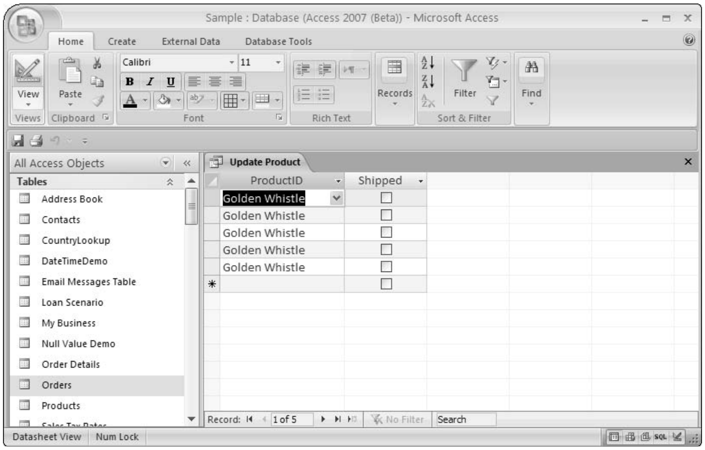
5. **Click the View button to view the datasheet to check if all the records you want to update, and none that you don't, are included.**

   Edit the query as needed until you see only the records you want to update in the datasheet. Figure 3-2 shows the datasheet for the query shown in Figure 3-1.

   If you use an expression to define how a record is updated, you may want to create a test field now to write your expression and make sure it works in the way you want. For instance, if you want to increase prices by 10 percent, you can create a new field: `[New Price]: [Selling Price]*1.10`. The test field appears in the datasheet when you view it, and you can check it for accuracy. For more information about writing expressions, see Chapter 2 of this minibook.

6. **Click the Update Query button in the Query Type group of the Design tab on the Ribbon to change the query to an update query.**

   Access adds an Update To row in the design grid.



ProductID	Shipped
Golden Whistle	□
Golden Whistle	□
Golden Whistle	□
Golden Whistle	□
Golden Whistle	□
*	□

Figure 3-2: The datasheet for the query in Figure 3-1, showing the Golden Whistle orders that haven't shipped.

7. **Use the Update To row to tell Access how to update the field.**

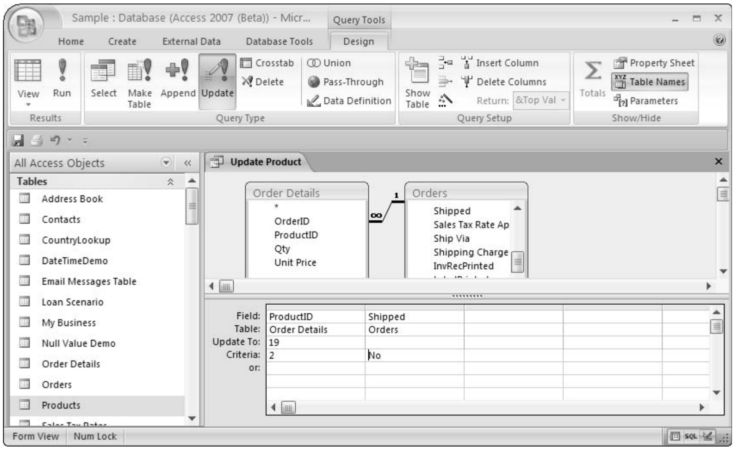
   The easiest update is to change one value to another by simply typing the new value in the Update To box for the appropriate field. More complex updates include expressions that tell Access exactly how to update the field. For example, to increase the `Selling Price` field in a table by 10 percent, you use the expression `[Selling Price]*1.10`. You can use the Expression Builder to help you build an expression for the Update To row; just click in the box and then click the Build button. (See Chapter 2 of this minibook for more information on using the Expression Builder to create expressions.)

   If you created a test field in Step 5, move the expression to the Update To row for the field that will be updated, and delete the field you created to test the expression. Note that you move the expression so it appears after the colon.

   Figure 3-3 shows the update query that finds all orders for the Golden Whistle and changes them to orders for the New Golden Whistle.

8. **Click the View button.**

   Access displays the datasheet with the records the query changes when you run it. If the data is not correct, return to Design view to correct the fields and criteria. This is the same data that you displayed in Step 5. You display it again to be sure you're making the changes you want to make. Check Design view over carefully to be sure that the Update To row is correct.



Field:	ProductID	Shipped
Table:	Order Details	Orders
Update To:	19	
Criteria:	2	No
or:		

Figure 3-3: This query finds all orders for Golden Whistles (`Product ID 2`) that haven't shipped, and changes them to New Golden Whistle (`Product ID 19`).

You can display only those fields in the datasheet that the update query is updating. If you want to get a fuller picture of the records you're updating (see the data for all the fields, for example), you can change the query back to a select query, add additional fields, and view the datasheet that your criteria produce. When you change the query back to an update query, the Update To options you added are still there. You need to remove any additional fields from the query grid before you run the update.

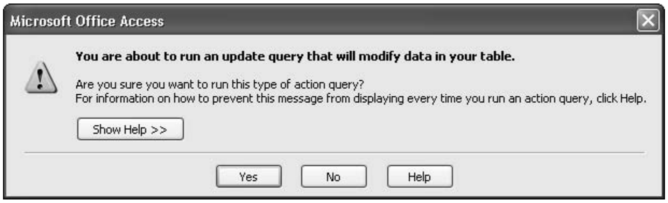
Only fields that are updated or used for criteria are allowed in update queries.

Be aware that the datasheet shows the data that will be changed. You can't see what is changed until you run the query. If you use an expression in the Update To row, testing that your expression produces the desired result by using a calculated field in a select query is important (see Step 5).

9. **Click the Run button to run the update.**

   Access warns you that after the records update, you can't undo the changes, as shown in Figure 3-4.

10. **Click the Yes button to update the data.**



Microsoft Office Access

You are about to run an update query that will modify data in your table.

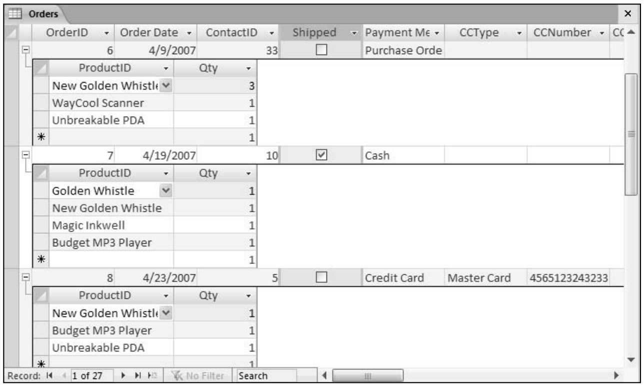
Are you sure you want to run this type of action query?
For information on how to prevent this message from displaying every time you run an action query, click Help.

Figure 3-4: When you click the Run button to run an update query, you see a warning like this one.

11. **Check the tables with affected fields to see whether the update query worked correctly.**

    Figure 3-5 shows the Orders table with the Order Details subtable. Golden Whistles in unshipped orders are replaced by New Golden Whistles.

12. **Delete the query if you won't be using it again; press Ctrl+S to save it if you will need it again.**



Orders

OrderID	Order Date	ContactID	Shipped	Payment Me	CCType	CCNumber	CC
6	4/9/2007	33	☐	Purchase Orde			

	ProductID	Qty
	New Golden Whistl	3
	WayCool Scanner	1
	Unbreakable PDA	1
*		1

OrderID	Order Date	ContactID	Shipped	Payment Me	CCType	CCNumber	CC
7	4/19/2007	10	☑	Cash			

	ProductID	Qty
	Golden Whistle	1
	New Golden Whistle	1
	Magic Inkwell	1
	Budget MP3 Player	1
*		1

OrderID	Order Date	ContactID	Shipped	Payment Me	CCType	CCNumber	CC
8	4/23/2007	5	☐	Credit Card	Master Card	4565123243233	

	ProductID	Qty
	New Golden Whistl	1
	Budget MP3 Player	1
	Unbreakable PDA	1
*		1

Figure 3-5: Go to the underlying tables to see changes made by the update query.

Creating New Tables with Make-Table Queries

A *make-table query* is useful if you need to make a new table to export or to serve as a backup. You can use a make-table query to make a new table that contains a copy of the data in a table or query. The new table can contain some or all of the fields and records from an existing table, or combine the fields from two or more tables — similar to the results of a select query.

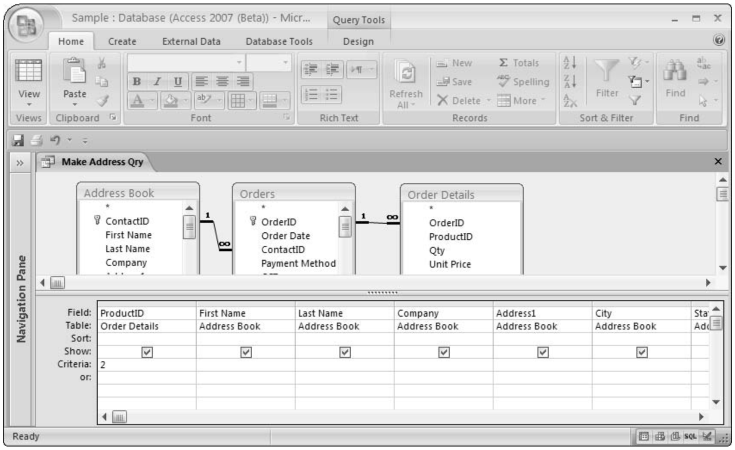
For instance, you can use a make-table query to create a table of customers who bought Golden Whistles — you decided to share their addresses with a school that offers whistle lessons.

To create a table with a make-table query, follow these steps:

1. **Create a select query that produces the records you want in a new table.**

   See Chapter 1 of this minibook for more information on creating a select query.

   Figure 3-6 shows a select query that finds the contact info for all customers who ever ordered Golden Whistles. Notice that although we only need fields from the Address Book and Order Details tables, the Orders table is also included in the query to define the relationship between the Order Details and the Address Book tables.



Field:	ProductID	First Name	Last Name	Company	Address1	City	Sta
Table:	Order Details	Address Book	Address Book	Address Book	Address Book	Address Book	Add
Sort:							
Show:	☑	☑	☑	☑	☑	☑	
Criteria:	2						
or:							

Figure 3-6: The select query finds customers who ordered Golden Whistles (item number 2) and lists their names and addresses.

2. **Click the View button on the toolbar to view the results.**

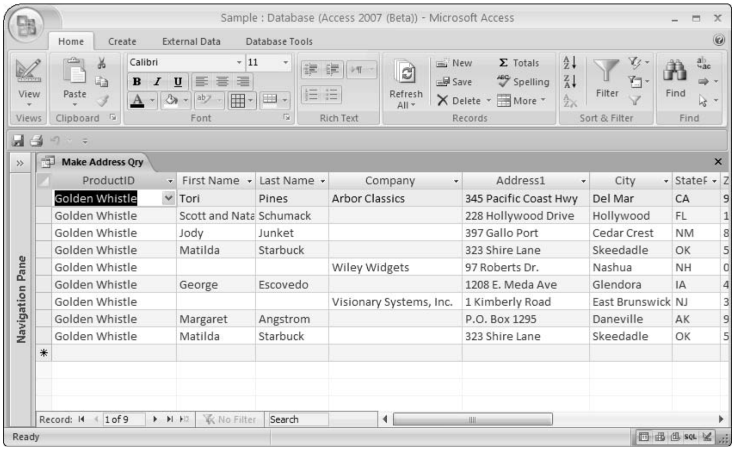
   Figure 3-7 shows the datasheet for our query.

3. **Click the View button on the toolbar to display Design view.**

   We don't want to include the `ProductID` field in the table that the make-table query creates, so we return to Design view and de-select the checkmark in the Show row for the `ProductID` field.

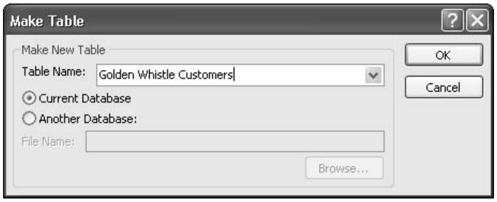
4. **Change the query type to a make-table query by clicking the Make Table button in the Query Type group of the Design tab on the Ribbon.**

   Access immediately displays the Make Table dialog box shown in Figure 3-8.



ProductID	First Name	Last Name	Company	Address1	City	StateF	Z
Golden Whistle	Tori	Pines	Arbor Classics	345 Pacific Coast Hwy	Del Mar	CA	9
Golden Whistle	Scott and Nata	Schumack		228 Hollywood Drive	Hollywood	FL	1
Golden Whistle	Jody	Junket		397 Gallo Port	Cedar Crest	NM	8
Golden Whistle	Matilda	Starbuck		323 Shire Lane	Skeedadle	OK	5
Golden Whistle			Wiley Widgets	97 Roberts Dr.	Nashua	NH	0
Golden Whistle	George	Escovedo		1208 E. Meda Ave	Glendora	IA	4
Golden Whistle			Visionary Systems, Inc.	1 Kimberly Road	East Brunswick	NJ	3
Golden Whistle	Margaret	Angstrom		P.O. Box 1295	Daneville	AK	9
Golden Whistle	Matilda	Starbuck		323 Shire Lane	Skeedadle	OK	5

Figure 3-7: The datasheet shows the customers and contact info of Golden Whistle purchasers.



Make New Table

Table Name: Golden Whistle Customers

● Current Database

○ Another Database:

File Name:

Figure 3-8: The Make Table dialog box.

5. **In the Table Name box, type the name of the table you're creating.**

   Although you're offered a drop-down list, you'll probably want to create a brand-new table with a brand-new name, so type a name for the table that isn't the name of any table currently in your database.

6. **Choose whether to create the new table in the current database or in another database.**

   If you choose the Another Database option, you can browse for an existing database.

   REMEMBER

   You cannot create a new database using a make-table query, only a new table in an existing database.

7. **Click OK to close the dialog box.**

   If you need to change the settings in the Make Table dialog box, click the Make Table button again to display the Make Table dialog box.

8. **Click the View button to see the records that will be in the new table.**

   You may need to return to Design view to edit the query until all the records you want in the new table appear in the datasheet when you click the View button.

9. **Click the Run button to create the new table.**

   Access asks whether you're sure — because you won't be able to undo your changes.

10. **Click the Yes button to create the new table.**

    Access quietly creates the new table.

11. **Check the new and old tables to make sure you get what you need in the new table.**

    You may want to edit the table design — the new table does not inherit the field properties or the primary key setting from the original table. (See Book II, Chapter 1 for more information on table design.)

Moving Data from One Table to Another with Append Queries

An *append query* copies data from one or more tables or queries in your database and adds the data selected by the query as new records to an existing table. As with other queries, you can use criteria to tell Access exactly which data to append.

Append queries are used to archive information, to move data between databases, as well as other useful housecleaning chores.

TIP

Cutting and pasting may be an easier way to append records from one table to another if you are only appending a few records. (See Book II, Chapter 4 for more information.)

Access gets a little picky about data that you append using an append query, especially with primary key fields. You must follow these rules when appending records to another table:

- Data that you want to append must have unique values in the primary key field. Each value in the primary key field must be unique in the table to which the data is being added, because by definition, no value can repeat in a primary key field. If the field is blank, or if the same value already exists in the table, Access does not append the records.
- If an AutoNumber field is in the table to which the data is being appended, do not append data in that field — Access automatically generates new numbers in the AutoNumber field for the new records; old values cannot be appended.
- The data type of each field you're appending must match the data type of fields in the table to which they're being added.

To create an append query, follow these steps:

1. **Create a select query that produces the records that you want to add to another table. Display the query in Design view.**

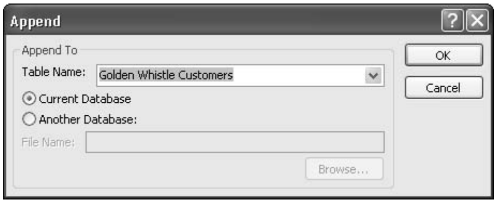
   See Chapter 1 of this minibook for details on creating a select query.

   You can check the criteria by viewing the datasheet to see whether the query is selecting the data you want to append. Click the View button on the toolbar to display the datasheet, and click the View button again to return to Design view.

2. **Change the query type to an append query by clicking the Query Type button.**

   Click the Append button in the Query Type group of the Design tab on the Ribbon.

   Access immediately displays the Append dialog box shown in Figure 3-9.



Append

Append To

Table Name: Golden Whistle Customers

● Current Database

○ Another Database:

File Name:

Figure 3-9: The Append dialog box tells Access where you want to append data.

3. **Choose the table to which you want to append the records in the Table Name box.**

   You can display the names of all the tables in the open database by displaying the Table Name drop-down list.

   You can add the records to a table in another database — find the database by clicking the Browse button.

4. **Click OK.**

   Access adds an extra row to the design grid: the Append To row. If the field names match the names of the fields you're appending, Access automatically fills in the Append To row with the names of the fields in the table you're appending records to.

5. **Carefully check the Append To row of the query grid and make any necessary changes.**

   The Field and Table rows show where the field comes from, and the Append To row shows where the data will be appended.

   If some of the fields don't have field names in the Append To row, display the drop-down list in the Append row and select the name of the field you want to append to. When you're finished, check each column to ensure that

   - The Field row contains the name of the field that contains data that you want to append to another table.
   - The Table row contains the name of the table that contains the data.
   - The Append To row contains the name of the field that the data will be appended to.
   - No field appears more than once in the Append To row.

6. **Click the Run button to run the append query.**

   Access tells you that you're about to append rows and that you won't be able to undo the changes.

   Be careful about running this query. If you run it twice, you append the records twice!

7. **Click the Yes button to run the query.**

   Access adds the records to the table you specified. You now have the same information in two tables.

8. **Save the query by pressing Ctrl+S if you think you'll use it again; otherwise, close it without saving.**

9. **Check your results.**

   Check the table you appended to as well as the table you appended from to make sure that Access copied all the records you wanted copied.

Deleting Lots of Records with Delete Queries

A *delete query* deletes whole records from tables, usually based on criteria you provide (although you can also use delete queries to delete all records in a table while keeping the field and table properties intact). Obviously, delete queries are a powerful feature, and should be treated with respect! Delete queries are dangerous — they permanently delete data from the tables in your database.

TIP

Always make sure that you have a backup before you run a delete query. You may want to back up the whole database or just the tables affected by the delete query.

TIP

Because delete queries can wreak such havoc with your database, you may want to consider whether manually deleting records meets your needs. You can delete a record by selecting it (click the record selector, the gray box to the left of the record) and pressing the Delete key on your keyboard or clicking the Delete Record button on the toolbar. You can select a group of records by double-clicking the first record selector and dragging to the last in the group, or by selecting the first record and then Shift+clicking the last in the group.

WARNING!

Before you run a delete query you need to be aware of how the table you're deleting data from is related to other tables in the database. In some cases, running a delete query can delete records in related tables. If the table you're deleting data from is on the one side of a one-to-many relationship, and cascading deletes are enabled for the relationship, Access looks for related data to delete. For instance, the Products table (which holds information for all the sold products) is related to the Order Details table (where ordered items are listed). The relationship is one-to-many, with Products on the "one" side. When you created the relationship between the two tables using the Edit Relationships dialog box (displayed from the Relationships window), if you selected Enforce Referential Integrity and Cascade Delete Related Records, then deleting records from the Products table results in Access deleting records from the Order Details table. Customers may not get the products they ordered, and no record of them ordering that item exists in the database. In this case, adding a `Discontinued` field to the Products table may be a better solution than deleting the records! (For more information on one-to-many relationships, see Book I, Chapter 4. For more information on referential integrity, see Book II, Chapter 6.)

When you tell Access to create a delete query, the Sort and Show rows in the design grid — the grid in the bottom pane of Design view — are removed and the Delete row is added. The Delete row has a drop-down list with two options that you only see with delete queries: the Where option and the From option. Use these two options to define the fields you want to see and the fields that you are using to define criteria to select the fields that will be deleted by the query:

- **Where:** Tells Access to use the criteria for the field to determine which records to delete.
- **From:** Displays the field when you view the datasheet for the query. You can choose the From option only when you use the * choice in the Field row to include all fields from a table. The asterisk appears as the first field for each table shown in the top half of Design view — when dragged to the design grid, Access displays all fields from the table. Viewing all fields

from a table in the datasheet gives you a more complete picture of the data you're deleting; otherwise, all you see in the datasheet are the values from the fields included in the design grid with criteria — rather than the entire record that the delete query will actually delete when you run it.

Follow these steps to create a delete query:

1. **In Design view, create a select query that produces the records you want to delete.**

   See Chapter 1 of this minibook for details on how to create a select query. Make sure you add to the query all tables containing records you want to delete.

2. **Drag the * option from each field list in the top half of Design view to the design grid to display all fields from the table or tables that contain records you want to delete.**

   Using the `*` option allows you to view all fields in the table. When you change the query to a delete query, only the `*` allows you to display fields not being used for criteria.

3. **Add fields to the design grid that you have criteria for, and then define those criteria.**

4. **Click the View button on the toolbar to view the datasheet.**

   The records you see are the records that you want the delete query to delete.

5. **Click the View button again to return to Design view.**

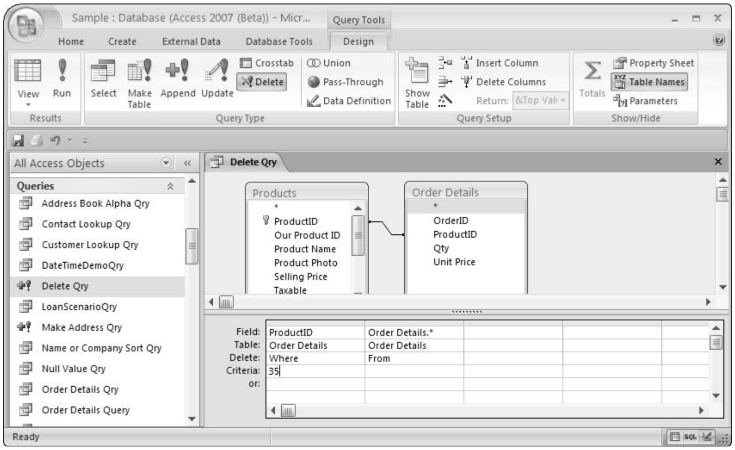
   Make any changes needed so the query selects only those records that you want to delete.

6. **Change the query type to a delete query by clicking the Delete button in the Query Type group of the Design tab on the Ribbon.**

   When you change the query type from select to delete, Access changes the rows in the design grid. The Sort and Show rows are removed, and the Delete row is added.

7. **Choose a value for the Delete row (if it's not set automatically) from the drop-down list in the following way: Set the fields that you want to view to the From option; set the fields that define criteria to the Where option.**

   Figure 3-10 shows an example of a delete query that will delete records with the `ProductID` value of `35` from the Order Details and Products tables. Note that when you view the datasheet you are seeing data from two different tables. All that data will be deleted, so data will be deleted from both tables.



Field:	ProductID	Order Details.*
Table:	Order Details	Order Details
Delete:	Where	From
Criteria:	35	
or:		

Figure 3-10: This delete query deletes records with the `ProductID` value of 35 from the Order Details and Products tables.

8. **Click the View button to view the datasheet again. Check to make sure that you see only the records that the delete query should delete.**

   If you see data in the datasheet that shouldn't be deleted — or if data that you want to delete is missing — correct the design of the query before you run it.

   A delete query deletes entire records.

9. **Return to Design view by clicking the View button.**

10. **Click the Run button to run the query.**

    Access deletes the data that you saw in Datasheet view — it's gone for good!

Finding Unmatched Records with a Wizard

Access has two categories of Neat Things You Can Do with Queries — action queries and the two query wizards covered here. The Find Unmatched Query Wizard finds records in one table that have no matching records in another, related table. For example, you may store orders in one table and details about customers in another table. If the tables are linked by, say, a `Customer Number` field, the Unmatched Query Wizard can tell you whether you have any customers listed in the Orders table who aren't listed in the Customers table.

Use the Find Unmatched Query Wizard to find unmatched records in the following way:

1. **Display the Create tab on the Ribbon.**
2. **Click the Query Wizard button in the Other group on the Ribbon.**

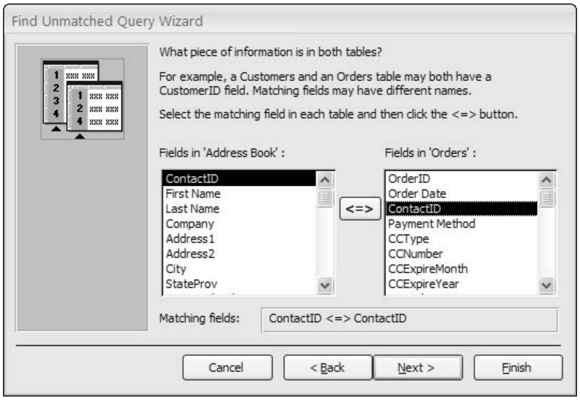
   The New Query dialog box opens.
3. **Select the Find Unmatched Query Wizard option, and then click OK.**

   The first window of the wizard appears.
4. **Select the table (or query) that may have unmatched records in a second table, and then click Next.**

   For instance, if you're looking for customers with no orders, select the table that holds the names of customers in this window. If you are looking for orders for which you don't have the customer address, select the Orders table in this step. The final result of the query lists records from the table that you select in this step that don't have matching records in the table you select in the next step.

   If you want to choose a query, click the Queries or Both radio button.
5. **Select the table (or query) that should contain the matching records for the data in the table you selected in the previous step, and then click Next.**

   For instance, if you are looking for customers with no orders, select the table that holds the order information. If you're looking for orders that don't have the customer address, select the table that holds customer addresses when you do this step.
6. **Check to make sure that Access correctly guessed the related fields in the two tables you selected in the third window of the wizard (shown in Figure 3-11); if it did, click Next.**



Find Unmatched Query Wizard

What piece of information is in both tables?

For example, a Customers and an Orders table may both have a CustomerID field. Matching fields may have different names.

Select the matching field in each table and then click the <=> button.

Fields in 'Address Book' :

ContactID
First Name
Last Name
Company
Address1
Address2
City
StateProv

Fields in 'Orders' :

OrderID
Order Date
ContactID
Payment Method
CCType
CCNumber
CCExpireMonth
CCExpireYear

Matching fields: ContactID <=> ContactID

Figure 3-11: Select related fields to find unmatched records.

The window shows field names in the two tables you selected. The names of the related fields are probably highlighted. Click the related field in each table if Access has not selected the correct related fields. The two fields that you select should contain the same information and be of the same data type.

7. **Select the fields you want to see in the query results in the next window of the wizard, and then click Next.**

   To select all fields, click the double arrow pointing to the right.

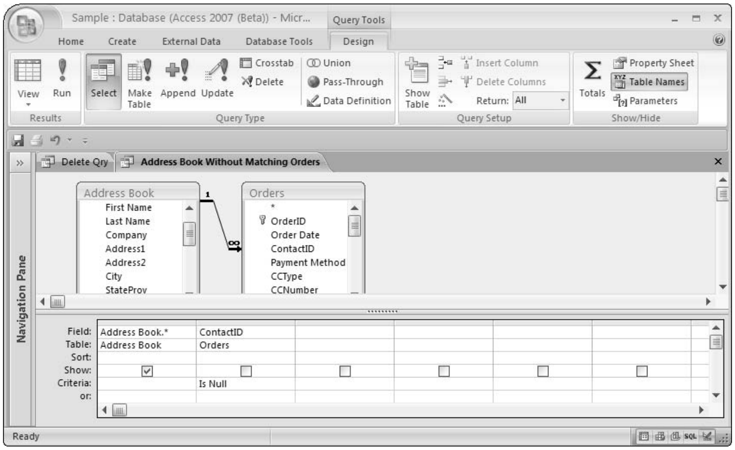
8. **Accept the name Access gives the query or name the query yourself in the final window of the Find Unmatched Query Wizard.**

9. **Choose whether you want to view the results or modify the design and click Finish.**

   Access displays the query in Design or Datasheet view as you requested.

If now isn't a good time to modify the design, you can do that later.

Note that you don't have to use a wizard to create this kind of query. The query shown in Figure 3-12 finds unmatched records in the Address Book table by using an inner join between the tables and the Is Null criteria for the related field in the table where matching records are stored. (For more about inner joins, see Chapter 1 of this minibook.)



Field:	Address Book.*	ContactID				
Table:	Address Book	Orders				
Sort:						
Show:	☑	□	□	□	□	□
Criteria:		Is Null				
or:						

Figure 3-12: Find unmatched records by using an inner join and the Is Null criterion.

In order to avoid unmatched records, define the relationship between the tables to enforce referential integrity. Define referential integrity in order to avoid creating orders for customers in the Orders table when you don't have contact information for them in the Address Book table. You may still find using the Find Unmatched Query Wizard useful though — for instance, you may want to find customers who have not placed any orders, or products that have not been ordered. (For more information on referential integrity, see Book II, Chapter 6.)

Finding Duplicate Records

When a table contains hundreds or thousands of records, spotting duplicates is not always easy. But the Find Duplicates Query Wizard can find them in an instant. Before you use the wizard, though, you need to really think about which combination of fields in a record constitutes a duplicate. For example, in a table of names and addresses, you wouldn't necessarily consider two records with the name `Jones` in the `Last Name` field duplicates, because two different people in your table may have the name Jones.

Not even the `First Name` and `Last Name` fields combined necessarily pinpoint duplicate records, because more than one Joe Jones or Chuma Jones can be in your table. On the other hand, if two or more records in your table contain the same information in the `Last Name`, `First Name`, `Address1`, and `ZIP Code` fields, then there's a good chance that those records are duplicates. If you do mass mailings, you may be sending two or more of every item to the customers whose records are duplicated.

Before you go looking for duplicate records, think about which combination of fields in your table will indicate records that are likely duplicates. Then use the Find Duplicates Query Wizard to seek out those records. Since the Find Duplicate Query Wizard only finds duplicates, you can use your judgment to delete records that look like duplicates. Follow these steps to run the wizard:

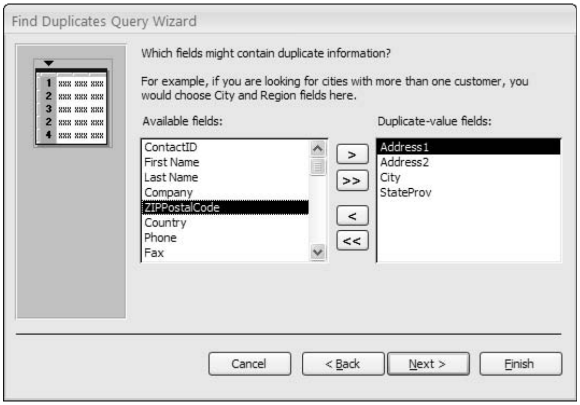
1. **Display the Create tab on the Ribbon.**
2. **Click the Query Wizard button in the Other group of the Ribbon.**

   The New Query dialog box opens.
3. **Select the Find Duplicates Query Wizard option, and then click OK.**

   The Find Duplicates Query Wizard starts.
4. **Click the name of the table you want to search in the first window of the wizard, and then click Next.**

   Optionally, you can click the Queries option and choose a query to use as the basis for the search.
5. **Use the > button to copy fields from the Available Fields list to the Duplicate-Value Fields list in the second window of the wizard, and then click Next.**

Be sure to include all of the fields that contain the data needed to define duplicate records. For example, in Figure 3-13 we're about to find records that have identical information in the `Address 1`, `Address 2`, `City`, and `StateProv` fields.



Find Duplicates Query Wizard

Which fields might contain duplicate information?

For example, if you are looking for cities with more than one customer, you would choose City and Region fields here.

Available fields:	Duplicate-value fields:
ContactID	Address1
First Name	Address2
Last Name	City
Company	StateProv
ZIPPostalCode	
Country	
Phone	
Fax	

Figure 3-13: Specify fields to compare in the second window of the Find Duplicates Query Wizard.

6. **Choose the fields to be shown for additional information in the third window of the wizard, and then click Next.**

   The fields you specify aren't used for comparing records. But they will appear in the query results to help you better identify any duplicate records. If your table has a primary key and/or date entered field, both are good candidates for this third field.

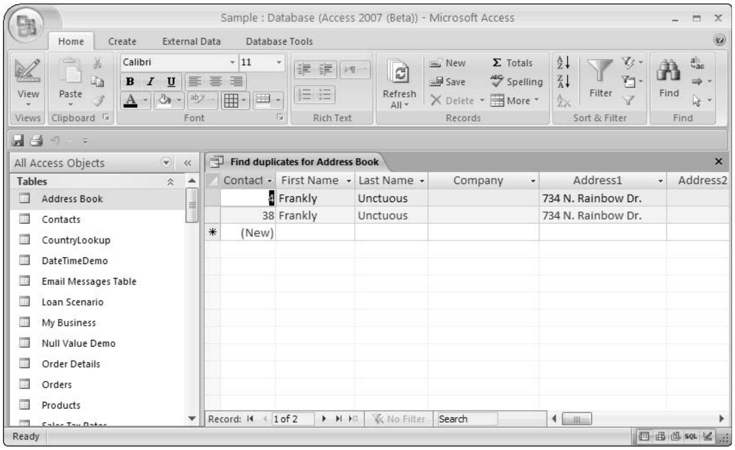
7. **Give the query a name.**

   Change the suggested name for the query, if you wish, or use the suggested name in the last window of the wizard.

8. **Choose the View the Results option, and then click the Finish button.**

The results of the query appear on-screen in Datasheet view. If no records appear, that means no records have identical values in the fields you specified in the wizard. You have nothing to worry about.

On the other hand, if records do appear, then you know you have duplicates. For example, in Figure 3-14, two records for Frankly Unctuous appear. Note the identical `First Name`, `Last Name`, and `Address` fields. The `ContactID` field allows us to see that two records for this customer are, indeed, in the table.



Contact	First Name	Last Name	Company	Address1	Address2
4	Frankly	Unctuous		734 N. Rainbow Dr.	
38	Frankly	Unctuous		734 N. Rainbow Dr.	
(New)					

Figure 3-14: Frankly Unctuous has two records in the table.

The handy Unique Values and Unique Records properties

Sometimes, rather than finding duplicates and deleting them, you just want to hide them. For instance, you may only need to see a list of states that your customers come from — you don't need to see Massachusetts fifty-six times (if you have fifty-six customers in Massachusetts).

The Properties sheet has two properties that allow you to hide duplicate values:

- **Unique Values:** Set the `Unique Values` property to the `Yes` value when you want to see only unique values for the fields displayed in the query. The `Unique Values` property omits duplicate data for the fields selected in the query. Every row displayed in the query datasheet is different.
- **Unique Records:** Set the `Unique Records` property to the `Yes` value when you want to see only unique records based on all fields in the underlying tables. The `Unique Records` property only affects fields from more than one table. A record is considered unique if a value in at least one field is different from a value in the same field in another record. Note that the primary key fields are included when records are compared.

To display the Properties sheet, right-click an empty part of the Table pane (the top half of the design grid) and choose the Properties option from the shortcut menu or click the Properties button on the toolbar.

The `Unique Values` and `Unique Records` properties apply only to select, append, and make-table queries. Note that when both are set to the `No` value (which is the default), the query returns all records.

Chapter 4: Viewing Your Data from All Angles Using Crosstabs and PivotTables

In This Chapter

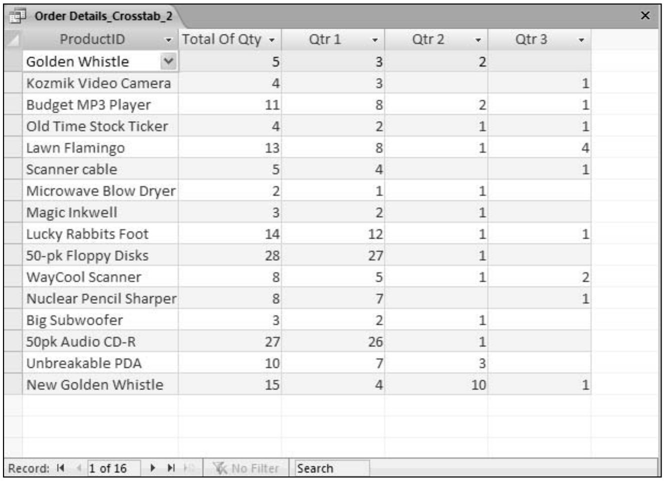
- **Understanding Crosstab queries**
- **Running the Crosstab Query Wizard**
- **Creating Crosstab queries in Design view**
- **Understanding PivotTables**
- **Using PivotTable view**
- **Selecting filter, data, and category fields for your PivotTable**

Sometimes, instead of viewing your data in records, you want to see it organized and categorized (what a concept). You may want to see sales of each product by month and you may want to see that information in a compact table, with months as the column titles, product names as the row titles, and the sum of sales in the body of the table. Access creates that kind of table in two ways — with a Crosstab query or a PivotTable. Both Crosstabs and PivotTables organize data and create totals using the aggregate function of your choice — sum, average, and count being the most popular. You create Crosstab queries in Design view, while the PivotTable view is all mouse driven — you drag and drop fields where you want them, use check boxes to create filters, and do nearly everything else with buttons and menu commands.

If you want to look at your data in lots of different ways in a short period of time, you'll prefer PivotTables — you can look first at product sales by month and then quickly shift the view to see which salespeople are selling the most of which product, and then shift again to see which states your customers come from for each product. But if you know exactly what you want and don't need to look at the data in another way (or if you want to use the results of the query as the record source for a report), you may prefer Crosstab queries. Take your pick — they're both covered in this chapter.

Aggregating Data in a Crosstab Query

A *Crosstab query* is a specialized query for summarizing data. Instead of creating a table with rows showing record data and columns showing fields, you can choose a field and group it using two other fields as row and column labels. Access groups the data the way you tell it to and aggregates the grouped field in the body of the table — you can choose between the usual aggregate functions such as sum, average, minimum, maximum, count, and all other available functions. For instance, if you chose the `Product` field for the column labels, the `Sales Month` field for the row labels, and the field that contains the sales subtotal for the product (price × quantity) as the information to put in the body of the table, and you tell Access to sum the result, the Crosstab query appears, shown in Figure 4-1, where sales of each product are shown by quarter. The result is a compact, spreadsheet-like presentation of your data.



Order Details_Crosstab_2

ProductID	Total Of Qty	Qtr 1	Qtr 2	Qtr 3
Golden Whistle	5	3	2	
Kozmik Video Camera	4	3		1
Budget MP3 Player	11	8	2	1
Old Time Stock Ticker	4	2	1	1
Lawn Flamingo	13	8	1	4
Scanner cable	5	4		1
Microwave Blow Dryer	2	1	1	
Magic Inkwell	3	2	1	
Lucky Rabbits Foot	14	12	1	1
50-pk Floppy Disks	28	27	1	
WayCool Scanner	8	5	1	2
Nuclear Pencil Sharper	8	7		1
Big Subwoofer	3	2	1	
50pk Audio CD-R	27	26	1	
Unbreakable PDA	10	7	3	
New Golden Whistle	15	4	10	1

Figure 4-1: This Crosstab query shows sales by product and quarter.

If you want to aggregate data without using a Crosstab query, see Chapter 2 of this minibook.

Using the Crosstab Query Wizard

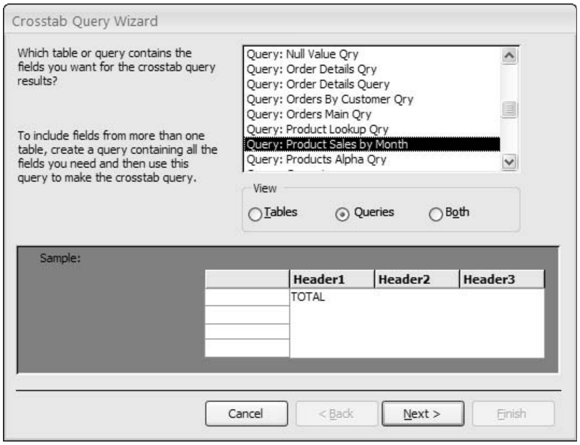
The Crosstab Query Wizard provides an automated way to create a Crosstab query. The wizard works only with one table or query. If the fields you want to use in the Crosstab query are not in one table, you have to create a query that combines those fields before you use the Crosstab Query Wizard. However, because the wizard does give you the option of aggregating date data (taking a Date/Time field and combining the data into months), you don't have to write an expression to aggregate data yourself. For instance, the Orders table saves the time and day an order is submitted. The Crosstab Query Wizard takes that date field and converts it to just the month (or the year, quarter, or day). In order to have the option to aggregate data, you must use the date field as a column heading.

Start the Crosstab Query Wizard by following these steps:

1. **Display the Create tab on the Ribbon.**
2. **Click the Query Wizard button in the Other group on the Ribbon.**

   The New Query dialog box opens.
3. **Select the Crosstab Query Wizard option and click OK.**

   Access starts the Crosstab Query Wizard, shown in Figure 4-2.



Which table or query contains the fields you want for the crosstab query results?

To include fields from more than one table, create a query containing all the fields you need and then use this query to make the crosstab query.

Query: Null Value Qry
Query: Order Details Qry
Query: Order Details Query
Query: Orders By Customer Qry
Query: Orders Main Qry
Query: Product Lookup Qry
Query: Product Sales by Month
Query: Products Alpha Qry

View
○ Tables ● Queries ○ Both

Sample:

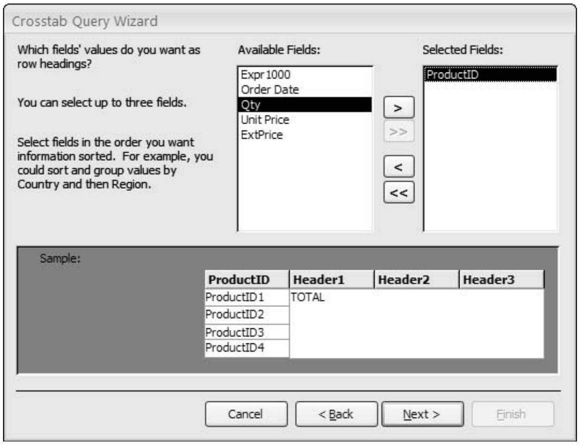
	Header1	Header2	Header3
	TOTAL		

Figure 4-2: Choose the table or query that contains the fields you want to use in the Crosstab query.

4. **Select the table or query that contains all the fields you need for your Crosstab query, and then click Next.**

   If you create a query to hold the fields you need, click the Queries or Both button to see the query name.
5. **In the new window that appears, shown in Figure 4-3, select the field(s) whose values you want to use as row headings and click Next.**

   You can select up to three fields to fine-tune the breakdown of your data. As you select fields, the sample at the bottom changes to reflect how your finished query will look.



Which fields' values do you want as row headings?

You can select up to three fields.

Select fields in the order you want information sorted. For example, you could sort and group values by Country and then Region.

Available Fields:

Expr1000
Order Date
Qty
Unit Price
ExtPrice

Selected Fields:

ProductID

Sample:

ProductID	Header1	Header2	Header3
ProductID1	TOTAL		
ProductID2			
ProductID3			
ProductID4			

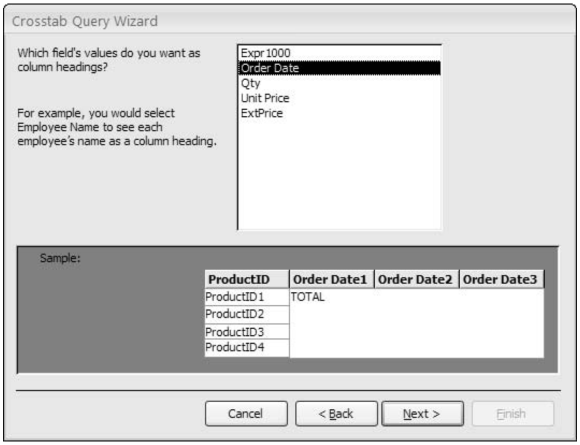
Figure 4-3: Choose the field(s) that contains the data used as the row headings for the Crosstab query.

Generally, the fields you select as row and column headings contain repeated data that is grouped in the Crosstab query. For instance, the `ProductID` field comes from the Order Details table and identifies products in each order. The Crosstab query can show you how many times a product is ordered, or how many units of each product is sold.

If you want the option of grouping date values, don't pick a Date/Time field here — use it for column headings instead.

6. **In the new window that appears, shown in Figure 4-4, select the field(s) whose values you want to use as column headings and click Next.**

   You can only select one field to use as the column headings. You may want to use a field containing dates and tell Access to group date values.



Which field's values do you want as column headings?

For example, you would select Employee Name to see each employee's name as a column heading.

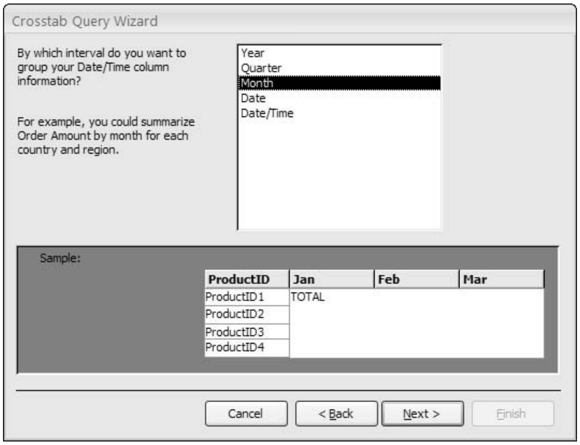
Expr1000
Order Date
Qty
Unit Price
ExtPrice

Sample:

ProductID	Order Date1	Order Date2	Order Date3
ProductID1	TOTAL		
ProductID2			
ProductID3			
ProductID4			

Figure 4-4: Choose the field you want to use as column headings.

7. **If you select a date field as the column headings, you see the window shown in Figure 4-5. Choose how to group dates from the list and click Next.**



Crosstab Query Wizard

By which interval do you want to group your Date/Time column information?

For example, you could summarize Order Amount by month for each country and region.

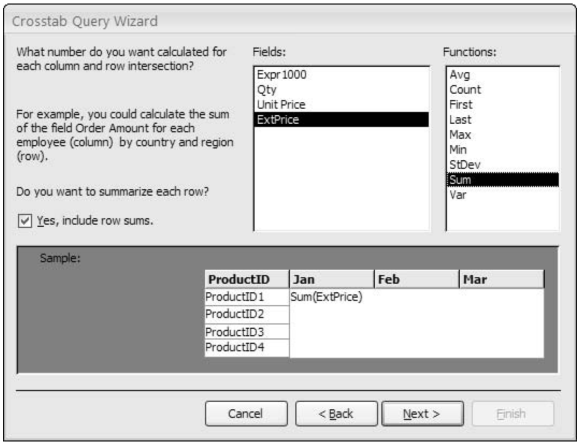
Sample:

ProductID	Jan	Feb	Mar
ProductID1	TOTAL		
ProductID2			
ProductID3			
ProductID4			

Figure 4-5: Choose how to group date and time data.

Choose one of the options listed. The Date/Time option shows data by unique Date and Time — data isn't grouped at all unless you have data with exactly the same time and date.

8. **In the new window that appears, shown in Figure 4-6, choose the field whose values you want to see grouped by the row and column headings that you selected.**



Crosstab Query Wizard

What number do you want calculated for each column and row intersection?

For example, you could calculate the sum of the field Order Amount for each employee (column) by country and region (row).

Do you want to summarize each row?

☑ Yes, include row sums.

Fields:

Functions:

Sample:

ProductID	Jan	Feb	Mar
ProductID1	Sum(ExtPrice)		
ProductID2			
ProductID3			
ProductID4			

Figure 4-6: Choose the field that contains values for the Crosstab query, and how you want to aggregate them.

The field you select usually contains numerical data that can be aggregated in some way (added together, averaged, and so on). The exception is if you want to count instances — then the field doesn't need to contain numbers.

Figure 4-6 uses the `Extended Price` field, which is price × quantity — the dollar amount of sales for each product.

9. **Select a grouping method from the Functions list.**

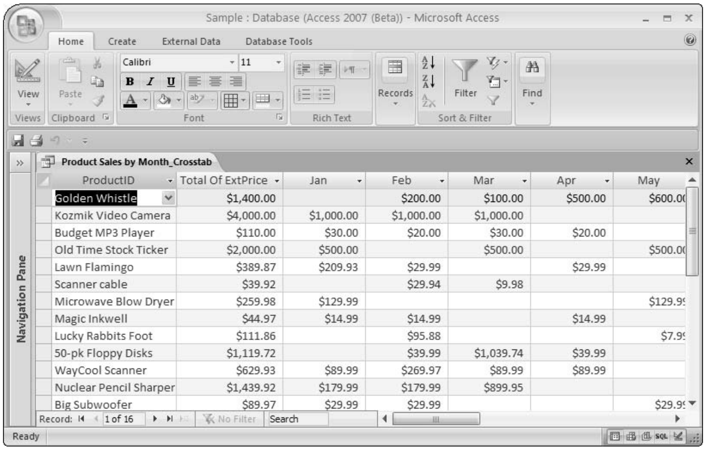
   You can find out more about these functions in Chapter 2 of this minibook. You can easily change this function in Design view if you change your mind after you view the Crosstab query.

10. **Choose whether to include row sums, and then click Next.**

    If you choose to include row sums, Access creates an extra column that contains the sum of the row — in this example, the total sales for the product.

11. **Name the query (or use the name that Access suggests), choose how you want to view the query (viewing the query datasheet or viewing the query in Design view), and then click Finish to see the Crosstab query.**

    See Figure 4-7 to see how our sample Crosstab query turned out!



Product Sales by Month_Crosstab

ProductID	Total Of ExtPrice	Jan	Feb	Mar	Apr	May
Golden Whistle	$1,400.00		$200.00	$100.00	$500.00	$600.0
Kozmik Video Camera	$4,000.00	$1,000.00	$1,000.00	$1,000.00		
Budget MP3 Player	$110.00	$30.00	$20.00	$30.00	$20.00	
Old Time Stock Ticker	$2,000.00	$500.00		$500.00		$500.0
Lawn Flamingo	$389.87	$209.93	$29.99		$29.99	
Scanner cable	$39.92		$29.94	$9.98		
Microwave Blow Dryer	$259.98	$129.99				$129.9
Magic Inkwell	$44.97	$14.99	$14.99		$14.99	
Lucky Rabbits Foot	$111.86		$95.88			$7.9
50-pk Floppy Disks	$1,119.72		$39.99	$1,039.74	$39.99	
WayCool Scanner	$629.93	$89.99	$269.97	$89.99	$89.99	
Nuclear Pencil Sharper	$1,439.92	$179.99	$179.99	$899.95		
Big Subwoofer	$89.97	$29.99	$29.99			$29.9

Figure 4-7: This Crosstab query shows sales of each product by month.

TIP

Look at the results of the Crosstab Query Wizard in Design view to get ideas about how to create a Crosstab query from scratch. You can get your Crosstab query started with the Crosstab Query Wizard, and then put the finishing touches on the query in Design view, which is covered in the next section.

Creating a Crosstab query in Design view

A simple Crosstab query has three fields:

- One used for row headings (`Date`, for example)
- One used for column headings (`Product`, for example)
- The `Value` field, which contains the data that you want to appear in the cells of the table (such as an item subtotal). Tell Access how to summarize your data in the Crosstab query by choosing from these choices: `Sum`, `Avg`, `Min`, `Max`, `Count`, `StDev`, `Var`, `First`, or `Last`.

Follow these steps to create a simple Crosstab query:

1. **Create a new select query in Design view with the tables that contain the fields you want to use in the Crosstab query.**

   Chapter 1 of this minibook covers creating select queries.

2. **Change the query to a Crosstab query by using the Crosstab button in the Query Type group of the Design tab on the Ribbon.**

   Access displays a Crosstab row in the design grid — the grid in the bottom half of the Design window. You use the Crosstab row to tell Access how to build the Crosstab query. Access also displays the Total row in the design grid, which allows you to choose from the aggregate functions or choose the Group By option.

   In the next steps you double-click fields in the Table pane of Design view to move them to the design grid, and then choose from the Crosstab row drop-down list the way each field is used to create the Crosstab.

3. **Double-click the field you want to use for row labels in the Table pane in the top half of Design view.**

   When you double-click the field name, Access moves it to the design grid.

   If you need to create the field with an expression, do that now.

4. **Click in the Crosstab row and then click the down arrow. Choose the Row Heading option from the drop-down list.**

   Set the Total row to the Group By option for this column in the grid.

5. **Double-click the field you want to use for column labels in the Table pane.**

   Access places the field in the design grid.

   If you need to create the field with an expression, do that now.

6. **Click in the Crosstab row for the new field and then click the down arrow. Choose the Column Heading option from the drop-down list.**

   Set the Total row to the Group By option for this column in the grid — chances are you won't have to make this change. (Click in the Total row to display the arrow for the drop-down list.)

7. **Double-click the field containing the values you want aggregated in your Crosstab query in the Table pane to put it in the grid.**

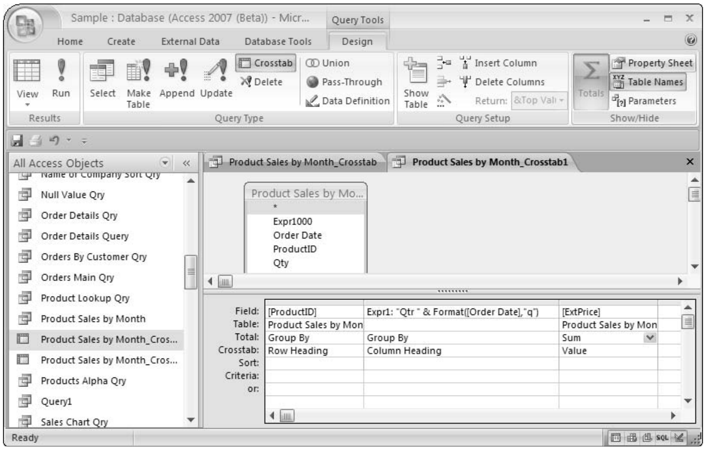
   This field — the `Value` field — provides the values that fill up the Crosstab query.

8. **Click in the Crosstab row for the new field in the grid and then click the down arrow in the Crosstab row. Choose the Value option from the drop-down list.**

9. **Choose the option to summarize the data from the drop-down list in the Total row for the `Value` field column.**

   Sum and average are common, but one of the other options may be the one you need. See Chapter 2 of this minibook for more on these aggregate options.

   Figure 4-8 shows the Design view for a Crosstab query that creates a query similar to the one created by the Crosstab Query Wizard in the previous section.



Field:	[ProductID]	Expr1: "Qtr " & Format([Order Date],"q")	[ExtPrice]
Table:	Product Sales by Mon		Product Sales by Mon
Total:	Group By	Group By	Sum
Crosstab:	Row Heading	Column Heading	Value
Sort:			
Criteria:			
or:			

Figure 4-8: This Crosstab query shows sales by product and quarter.

10. **Click the View button to view your new Crosstab query.**

    You may want to edit your query design, or make some of the modifications described in the next section.

Modifying your Crosstab query

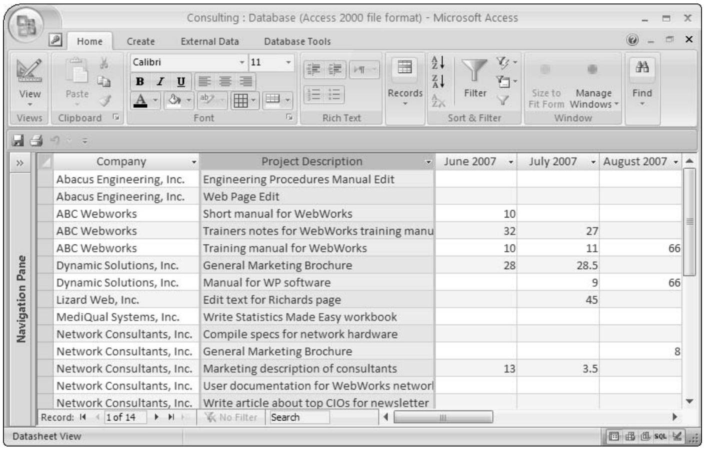
After you figure out the basics of creating a Crosstab query — choosing fields for the row headings, column headings, and the value field, and then specifying how the data is aggregated — you may want to do any of the following to add more to the query design.

Using criteria

You can include criteria to narrow the data aggregated in a Crosstab query. You add criteria in the design grid to the fields used for row headings and column headings, but not to the field used for values. If you want to specify a criterion for the value field, you can put the field in the query a second time, set its Total row to the Group By option, leave the Crosstab row option blank, and define the criteria. Using the same method, you can add any field to the design grid and define criteria — just leave the Crosstab row blank.

Multiple fields for row headings

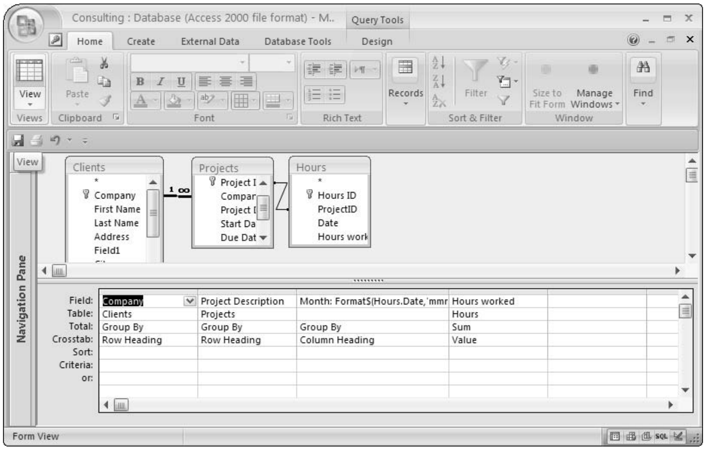
You can use more than one field for row headings. The resulting Crosstab query groups rows using both fields. Figure 4-9 shows hours grouped by company and project.



Company	Project Description	June 2007	July 2007	August 2007
Abacus Engineering, Inc.	Engineering Procedures Manual Edit			
Abacus Engineering, Inc.	Web Page Edit			
ABC Webworks	Short manual for WebWorks	10		
ABC Webworks	Trainers notes for WebWorks training manu	32	27	
ABC Webworks	Training manual for WebWorks	10	11	66
Dynamic Solutions, Inc.	General Marketing Brochure	28	28.5	
Dynamic Solutions, Inc.	Manual for WP software		9	66
Lizard Web, Inc.	Edit text for Richards page		45	
MediQual Systems, Inc.	Write Statistics Made Easy workbook			
Network Consultants, Inc.	Compile specs for network hardware			
Network Consultants, Inc.	General Marketing Brochure			8
Network Consultants, Inc.	Marketing description of consultants	13	3.5	
Network Consultants, Inc.	User documentation for WebWorks networl			
Network Consultants, Inc.	Write article about top CIOs for newsletter			

Figure 4-9: This Crosstab query uses two fields as row labels to group hours worked — the `Company` field and the `Project Description` field.

To use multiple fields to group data by row, specify more than one field as a row heading in the design grid. Access figures out in which order to use the fields — the field on the "one" side of a one-to-many relationship displays first. Figure 4-10 shows the design grid for the same query.



Field:	Company	Project Description	Month: Format$(Hours.Date,'mmr	Hours worked	
Table:	Clients	Projects		Hours	
Total:	Group By	Group By	Group By	Sum	
Crosstab:	Row Heading	Row Heading	Column Heading	Value	
Sort:					
Criteria:					
or:					

Figure 4-10: Specifying two fields as row labels to group hours worked — the `Company` field and the `Project` field.

Adding aggregate columns

A calculated column is an additional column in the query that totals rows displayed in the query. For instance, you may add a column that calculated the total number of the product sold to a query that displays sales by month and product.

You can add calculated columns to a Crosstab query — they are added as row headings, and appear by default as the first column after the actual row headings. If you include row sums in a Crosstab query, a calculated column is automatically created as a row heading that uses the `Sum` option in the Total row. You may want to calculate other values using other aggregate functions.

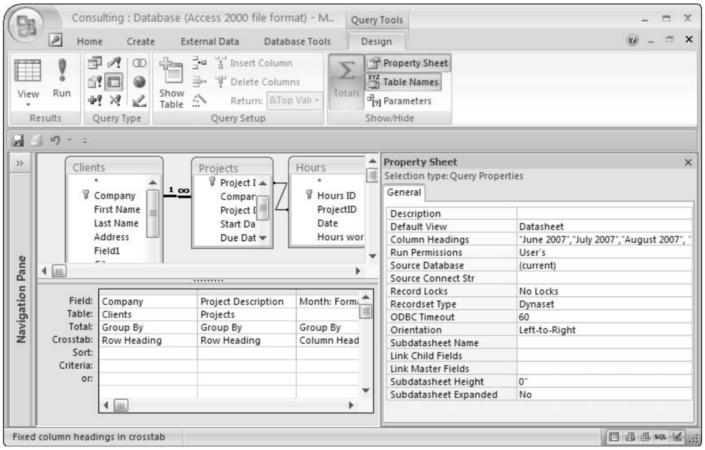
Getting months in order

By default, Access sorts column and row headings in alphabetical or numerical order. But usually, calculated dates (specifically months) need to appear in chronological order, rather than alphabetical and numerical order. PivotTables (described in the next section) are better at sorting data grouped in this way, but you can fix your Crosstab query to appear in chronological order in one of two ways:

- Move columns manually in Datasheet view — click the column heading to select the column, and then drag the column heading to its new position.

Property Sheet

- Specify the sort order in the Property sheet for the query. First display the Property sheet from within Design view by clicking the Property Sheet button on the Design tab on the Ribbon, and then type out the column headings in order in the `Column Headings` property, using quotes around the date and separating dates with commas as shown in Figure 4-11. Be sure to use the dates as they appear on the datasheet.



Field:	Company	Project Description	Month: Form:
Table:	Clients	Projects	
Total:	Group By	Group By	Group By
Crosstab:	Row Heading	Row Heading	Column Head
Sort:			
Criteria:			
or:			

Property Sheet

Selection type: Query Properties

General

Description	
Default View	Datasheet
Column Headings	"June 2007","July 2007","August 2007", "
Run Permissions	User's
Source Database	(current)
Source Connect Str	
Record Locks	No Locks
Recordset Type	Dynaset
ODBC Timeout	60
Orientation	Left-to-Right
Subdatasheet Name	
Link Child Fields	
Link Master Fields	
Subdatasheet Height	0"
Subdatasheet Expanded	No

Fixed column headings in crosstab

Figure 4-11: Use the `Column Headings` property to list column headings in order.

Analyzing Data with PivotTables

A PivotTable is an interactive tool to help you analyze your data. When you work with a PivotTable, you can quickly drag fields and create new totals to present an entirely new view of your data, or drill down to see the individual pieces of data that make up a total. PivotTables are closely related to Crosstab queries in the way they present your data — they group data into rows and columns, with the row and column headings defined by fields. Using a PivotTable, you can select how to categorize data into rows and columns, choose fields to be summarized in the body of the table, and filter the data. And rather than using Design view to define the table, you create and make changes to a PivotTable just by clicking the table and dragging field names or choosing from automatically created drop-down menus that reflect your data.

Creating a blank PivotTable

For many objects we recommend that you start with the wizard and then use Design view to make refinements that the wizard can't manage. However, the PivotTable Wizard doesn't do much for you except allow you to use fields from multiple tables or queries. You may choose to use the wizard for this reason, or you may want to gather all the fields you need into a single query, and go from there.

To create a blank PivotTable, shown in Figure 4-12, first create a query that contains all the fields you want in your PivotTable, and then use one of the following options:

- ✦ Open the query containing your data, and then click the PivotTable View button in the bottom-right corner of the Access window — it's the second in the group of five tiny buttons.

- Select the query containing your data in the Navigation Pane. Then Display the Create tab on the Ribbon and click the More Forms button in the Forms group. Select PivotTable from the drop-down list.

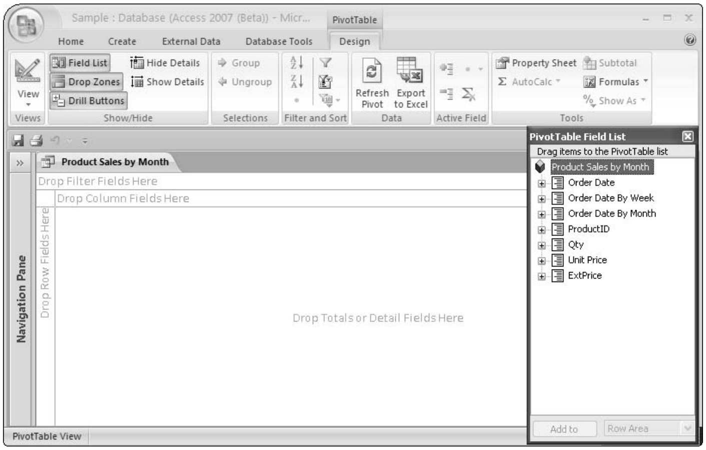


Figure 4-12: At first your PivotTable is blank.

After you create a PivotTable using one of the methods, you see a blank PivotTable with a PivotTable Field List. If you don't see the Field list, click the Field List button on the Design tab on the Ribbon.

Displaying data in your PivotTable

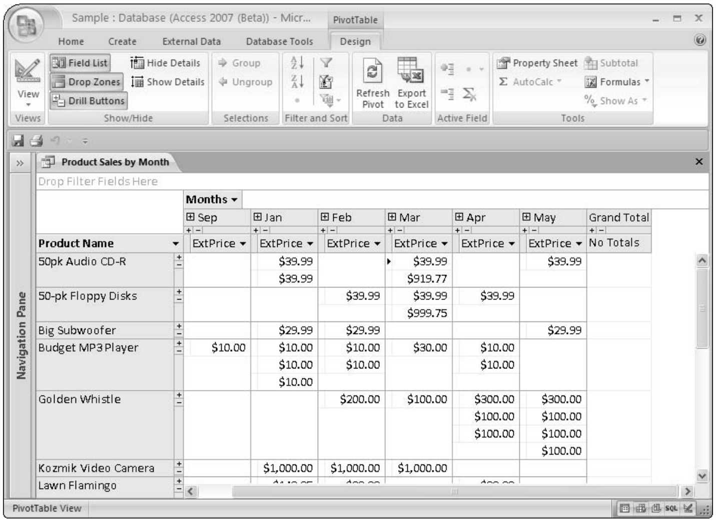
To see data after you create a blank PivotTable, you need to drag and drop fields into the drop areas. Each field name in the PivotTable Field List has a plus sign *(expand indicator)* or a minus sign *(collapse indicator)* next to it. Click an expand indicator in the PivotTable Field List to see more options for fields to drag and drop. In particular, Access adds fields to categorize date data by week, month, quarter, and so on.

The four drop areas are as follows:

- **Totals or Detail Fields:** Drag the name of the field that contains the values you want displayed in the body of the PivotTable to this drop area. The values in this field are organized by the values in the column and row fields. After you drag a field to the Totals or Detail Fields drop area, you see data in your PivotTable.
- **Column Field:** Drag the name(s) of the field(s) you want to show as column headings to this area.

- ✦ **Row Field:** Drag the name(s) of the field(s) you want to show as row headings to this area.
- ✦ **Filter Fields:** Drag the names of any fields you want to use for filtering purposes to this area.

You can start dragging fields in any order. After you drop a detail field onto the PivotTable, you see data in the table. Figure 4-13 shows a PivotTable with the `Product Name` field in the rows drop area, the `Order Date by Month` field in the columns drop area, and the `ExtPrice` field in the body of the table. (The `ExtPrice` field is equal to price × quantity, and is the amount spent on the item — it accounts for records in which a single person bought more than one of the item.) Fields used in the PivotTable appear in bold in the Field list.



Drop Filter Fields Here

	Months						
	⊞ Sep	⊞ Jan	⊞ Feb	⊞ Mar	⊞ Apr	⊞ May	Grand Total
Product Name	ExtPrice	ExtPrice	ExtPrice	ExtPrice	ExtPrice	ExtPrice	No Totals
50pk Audio CD-R		$39.99 $39.99		$39.99 $919.77		$39.99	
50-pk Floppy Disks			$39.99	$39.99 $999.75	$39.99		
Big Subwoofer		$29.99	$29.99			$29.99	
Budget MP3 Player	$10.00	$10.00 $10.00 $10.00	$10.00 $10.00	$30.00	$10.00 $10.00		
Golden Whistle			$200.00	$100.00	$300.00 $100.00 $100.00	$300.00 $100.00 $100.00 $100.00	
Kozmik Video Camera		$1,000.00	$1,000.00	$1,000.00			
Lawn Flamingo		[illegible]	[illegible]		[illegible]		

Figure 4-13: A PivotTable showing ExtPrice organized by Product Name and Order Date.

Use these steps to see data in your PivotTable:

1. **Drag and drop a field from the PivotTable Field List into the main part of the PivotTable — the part labeled Drop Totals or Detail Fields Here.**

   Choose the field that you want to see organized using other fields.

   TIP: If the drop areas aren't visible in your PivotTable, click Drop Zones in the Show/Hide section of the Design tab.

   A cell for each record of data appears. Now, by adding row and column labels, you can categorize that data. Later, you summarize it using the AutoCalc button.

TIP

If you prefer not to drag and drop, select the field in the Field list, use the drop-down list at the bottom of the Field list to tell Access where you want to use the field, and click the Add To button.

Fields used in the PivotTable appear in bold in the PivotTable Field List, as shown in Figure 4-14.

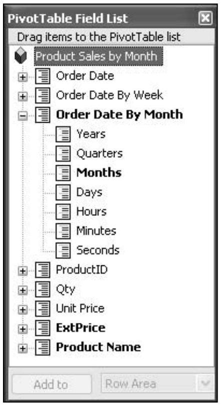


Figure 4-14: Bolded field names are used in the PivotTable.

2. **Drag and drop a field into the Drop Row Fields Here section of the PivotTable — the section on the left — to create row labels.**

   You may want to click an expand indicator in the PivotTable Field List to see more options for fields to drag and drop. In particular, Access adds fields to categorize date data by week, month, quarter, and so on.

3. **Drag and drop a field into the Drop Column Fields Here section of the PivotTable to create column labels.**

   Your table may look something like Figure 4-13.

   The resulting table may be confusing because you see each record rather than data totals. However, changing that isn't difficult.

4. **Click a column label that names the field displayed in the body of the table to see the totaled data. (In Figure 4-13, that's the ExtPrice column.)**

   All like-named column headings are selected automatically.

Σ AutoCalc ▾

5. **Click the AutoCalc button on the Design tab on the Ribbon and choose the type of total you want to use.**

See Chapter 2 of this minibook for more information about the aggregation choices. For Text fields, your only option is the Count total.

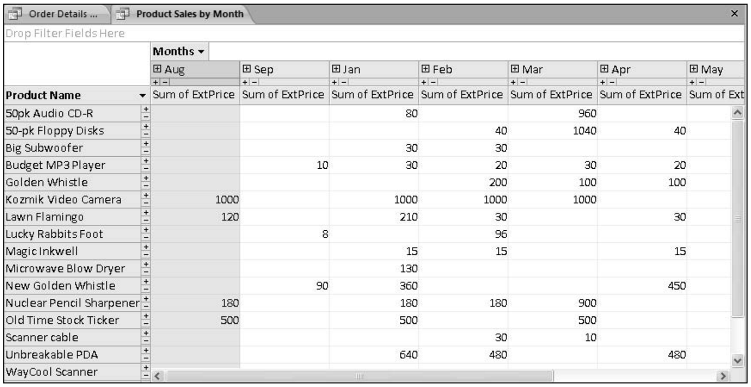
You now see a Total column at the far right of the table and a Total row at the bottom of the table. Each cell in the table also gains an extra piece of information at the bottom of the cell: the sum, count, or other aggregation of the data in the cell. Also, the new field is added to the Pivot Table Field List.

Hide Details

6. **Click the Hide Details button on the Design tab on the Ribbon.**

   The table now displays aggregates, shown in Figure 4-15. You can show or hide the details for each row or column by clicking the expand (+) or collapse (–) indicator in the row or column heading.

   You can now add or remove categories to see your aggregated data in several different ways.



Order Details ... | Product Sales by Month

Drop Filter Fields Here

	Months						
	⊞ Aug	⊞ Sep	⊞ Jan	⊞ Feb	⊞ Mar	⊞ Apr	⊞ May
Product Name	Sum of ExtPrice	Sum of ExtPrice	Sum of ExtPrice	Sum of ExtPrice	Sum of ExtPrice	Sum of ExtPrice	Sum of Ext
50pk Audio CD-R			80		960		
50-pk Floppy Disks				40	1040	40	
Big Subwoofer			30	30			
Budget MP3 Player		10	30	20	30	20	
Golden Whistle				200	100	100	
Kozmik Video Camera	1000		1000	1000	1000		
Lawn Flamingo	120		210	30		30	
Lucky Rabbits Foot		8		96			
Magic Inkwell			15	15		15	
Microwave Blow Dryer			130				
New Golden Whistle		90	360			450	
Nuclear Pencil Sharpener	180		180	180	900		
Old Time Stock Ticker	500		500		500		
Scanner cable				30	10		
Unbreakable PDA			640	480		480	
WayCool Scanner							

Figure 4-15: This PivotTable shows aggregate data — total sales for each product for each month.

When you use a lookup field in a PivotTable, you see the data that Access stores in the field, not the data usually displayed. (***Remember:*** A lookup field displays a drop-down list of data to choose from that is stored in a table or a list.) In general, you use the descriptive field in the PivotTable rather than the lookup field to see the appropriate data. We use the `Product Name` field rather than the `Product ID` field in this chapter, even though (in most views) those two fields display the same data. (For more on lookup fields, see Book II, Chapter 5. For information on using lookup fields in queries, see Chapter 1 of this minibook.)

TIP

Working with dates

You may have noticed that the PivotTable Field List has a + next to each field name. Click the expand indicator (+) to see an indented list of fields, which is most useful when working with Date/Time fields.

Access does some neat things with Date/Time fields in the PivotTable Field List — it automatically creates fields to aggregate date data by year, quarter, month, week, day, hour, minute, and second. (Refer to Figure 4-14 to see date fields in the Field list.)

The two different date headings, Order Date By Week and Order Date By Month, allow you to use a date as a column field and a date as a row field — but you must select the dates from different indented lists. For instance, you may want to see years in columns and months in rows to compare monthly sales from year to year.

To view data by month, find the `Months` field in one of the date fields and drop it in the PivotTable.

After you have a date field in the columns or rows heading, you can expand the heading using the expand indicator (+) next to the field in the PivotTable (not in the Field list) to display date data in more detail.

Modifying your PivotTable

After you have a basic PivotTable, you can modify it to look exactly how you want. You can add fields, move fields around to different drop areas, format your data, create new fields, expand and collapse details, and more.

For much of the work involved in modifying a PivotTable, your best friend is the PivotTable Tools Design tab on the Ribbon. Table 4-1 lists the buttons in the PivotTable tab and what they do.

Refresh Pivot

If the data in your database changes while your PivotTable is open, be sure that the table reflects the most current data by clicking the Refresh Pivot button on the PivotTable toolbar.

Table 4-1 PivotTable Buttons

Name	*What It Does*
Save	Saves the format of the object, which includes the format of the PivotTable.
View	View the PivotTable in another view. PivotChart is always available. The other options depend on which kind of object you use to create the PivotTable — table or query.
Field List	Displays or hides the Field list available for this PivotTable.

Name	*What It Does*
Drop Zones	Displays or hides the labels for the areas where you can drop field names (that is, Drop Filters Here).
Drill Button	Displays or hides the + and – buttons that allow you to drill down into data.
Hide Details	Hides detail values (one value for each record of data) and displays only totals (if any are defined).
Show Details	Shows detail values (one value for each record of data).
Group	Allows you to create groups on the fly by selecting rows or columns and clicking the Group button.
Ungroup button.	Ungroup a group by clicking to select it, and then clicking this
Sort Ascending	Sorts the selected part of the PivotTable in ascending order.
Sort Descending	Sorts the selected part of the PivotTable in descending order.
AutoFilter	Applies (or removes) a filter already defined (such as a Show Top/Bottom Items filter).
Show Top/Bottom Items	Choose to see top or bottom values. Choose either a percentage of values or a number of data points that you want to see. Click again to cancel the filter.
Refresh	Displays new and updated data.
Export to Microsoft Excel	Exports the PivotTable to Microsoft Excel (usually to make use of PivotTable functionality in Excel).
Expand	Expands the selected cell, column, or row.
Collapse	Collapses the selected cell, column, or row.
Move	Displays a drop-down list allowing you to move the field to Field Area, Column Area, Filter Area, or Detail Area.
Remove	Removes the selected totals field.
Property Sheet	Displays PivotTable properties.
AutoCalc	Calculates an aggregate field by selecting the field to aggregate by clicking a field name in the table and then choosing from the AutoCalc drop-down list.
Subtotal	Calculates subtotals when the PivotTable has at least one total field and at least two fields as either row or column headings.
Formulas	Creates a new, calculated, total, or detail field.
Show As	Displays the values or percentage of a total.

Working with PivotTable data

Changing the way your PivotTable displays data is the fun part! Drag fields around, in, and out of the table to your heart's content — or until you have a table that shows the data you need in an easy-to-analyze format.

To change the data in your PivotTable, you have two basic options:

- **Add additional row and column categories:** Drag fields from the PivotTable Field List or from one part of the PivotTable to another. A blue line appears to show you where the field will drop. Watch the blue line — particularly the ends of the line — that tells you where you are dropping a field.
- **Remove categories:** Drag a field name off the table (until you see an *X* next to the pointer) to remove it from the table.

If you want to save the PivotTable data, export it to Excel using the Export to Microsoft Excel button.

Showing/hiding details

By default, Access shows detail data, which means you see a heck of a lot of data. But you may be interested only in summary data, such as totals.

You may have noticed that every row and column label on the PivotTable has expand (+) and collapse (–) indicators. When a category expands, you see details; when it collapses, you see only the total. Use these buttons to see more — or less — of the data. You can change an individual row or column, or you can expand or collapse an entire category by clicking a heading and then clicking the Collapse or Expand buttons on the toolbar.

Adding totals and grand totals

Use the AutoCalc button to create totals. Select the field you want to total; then click the AutoCalc button and choose how to total the values. (See the section, "Displaying data in your PivotTable," earlier in this chapter.)

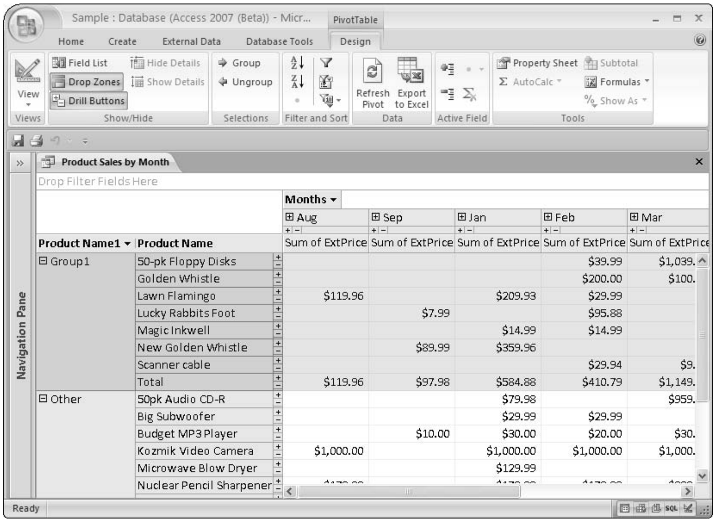
Here's how to add grand totals to the PivotTable:

1. **Scroll to the far-right column of the PivotTable until you get to the Grand Total column.**
2. **Drag the name of the field you want totaled to the Grand Total column, and drop it there.**

   You can drag the field name from the Field list or somewhere else in the PivotTable. The empty Grand Total column fills with totals.

Grouping data

You can easily group data on the fly in a PivotTable. For instance, if you want to create groups of products to see subtotals, just select the products in a group by clicking the first product and Ctrl+clicking subsequent products; then click the Group button. Figure 4-16 shows products sorted into two groups. The Other group can be further sorted as necessary: All you have to do is select the products you want to group and then click the Group button again.



		Months				
		⊞ Aug	⊞ Sep	⊞ Jan	⊞ Feb	⊞ Mar
Product Name1	Product Name	Sum of ExtPrice	Sum of ExtPrice	Sum of ExtPrice	Sum of ExtPrice	Sum of ExtPrice
⊟ Group1	50-pk Floppy Disks				$39.99	$1,039.
	Golden Whistle				$200.00	$100.
	Lawn Flamingo	$119.96		$209.93	$29.99	
	Lucky Rabbits Foot		$7.99		$95.88	
	Magic Inkwell			$14.99	$14.99	
	New Golden Whistle		$89.99	$359.96		
	Scanner cable				$29.94	$9.
	Total	$119.96	$97.98	$584.88	$410.79	$1,149.
⊟ Other	50pk Audio CD-R			$79.98		$959.
	Big Subwoofer			$29.99	$29.99	
	Budget MP3 Player		$10.00	$30.00	$20.00	$30.
	Kozmik Video Camera	$1,000.00		$1,000.00	$1,000.00	$1,000.
	Microwave Blow Dryer			$129.99		
	Nuclear Pencil Sharpener					

Figure 4-16: This PivotTable shows the products sorted into two groups using the Group button.

After groups have been created, you can use them to filter the PivotTable. Here's how:

1. **Click the drop-down arrow for Group parent (in Figure 4-16, that's the Product Name1 cell).**

   The filter options appear.

2. **Then click the group(s) that you want to display.**

3. **Click OK to see the resulting PivotTable.**

   The data is displayed with some groups hidden, and totals updated to match the new data. To unfilter, repeat these steps and choose All in the Filter options.

Adding a calculated field

You can also create a new, calculated field while in PivotTable view. *Calculated fields* are new fields that you create with an equation, known in Access-speak as an *expression*. When you create a calculated field in PivotTable view, you have the choice of creating a total or a detail field. A detail field has a value for every record, while a total field has only a value for every category shown on the PivotTable. For more about creating calculated fields, see Chapter 2 of this minibook.

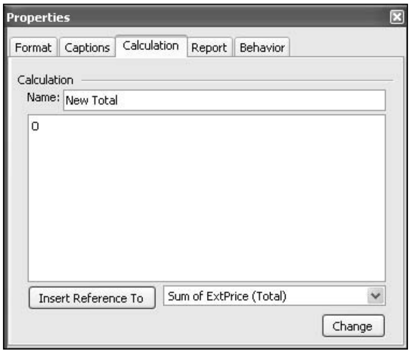
Follow these steps:

1. **Click the Formulas button in the Tools group of the Design tab on the Ribbon.**

   Access displays a drop-down list.

2. **Choose the Create Calculated Total option or the Create Calculated Detail Field option.**

   Access displays the Calculation tab of the Properties sheet, shown in Figure 4-17.



Name: New Total

0

Sum of ExtPrice (Total)

Figure 4-17: Create a new field using the Calculation tab of the Properties sheet.

3. **Name the new field.**

   Type a descriptive name for the new field in the Name box.

4. **Write the expression to calculate the new field.**

   You write the expression in the usual way (see Chapter 2 of this minibook). You can also use the Insert Reference To button to put a field name into the expression.

   You can use functions, but you must know the exact syntax. (You may prefer to create the new field in Design view — see the tip after these steps.)

5. **Click the Change button to create the new field.**

6. **Close the Properties sheet.**

   The new field appears in the PivotTable Field List. If the new field is a total field, it appears indented under the Totals category, at the top of the Field list.

After you create a new field, you can drag it into the table.

TIP

You can also create a new field in Design view. If you work in the PivotTable view of a query, switch to Design view (click the View button) and create a new detail field. When you switch back to PivotTable view, the new field is available in the PivotTable Field List. You can use the Expression Builder when you create a new field using Design view — useful if you create an expression that uses functions.

Charting your PivotTable

CROSS-REFERENCE

You may find you want to view your PivotTable graphically. You can — with PivotChart view. Click the View button and choose the PivotChart option from the drop-down menu. PivotChart view reflects the layout of the PivotTable. (See Book V, Chapter 3 for more on how to use PivotCharts.)

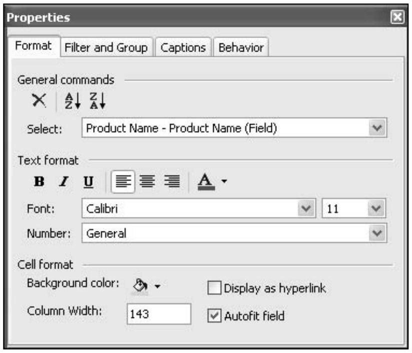
WARNING!

If you change the layout of your PivotChart, your PivotTable reflects those changes — and vice versa. If you want both a PivotChart and a PivotTable to work with, create two identical objects (queries or forms) — one for the chart, and one for the table.

Formatting PivotTables

Property Sheet

PivotTables do have some formatting options. You find some of the normal text-formatting options through the Properties sheet: Click the Property Sheet button. When the Properties sheet appears (as shown in Figure 4-18), click the Format tab.



Select: Product Name - Product Name (Field)

Font: Calibri 11

Number: General

Background color:

□ Display as hyperlink

Column Width: 143

☑ Autofit field

Figure 4-18: The Format tab of the Properties sheet changes text formatting.

Before you select format options, click the Select drop-down list to tell Access what part of the PivotTable you are formatting. To make changes to the whole table, follow these steps:

1. **Select the Microsoft Office PivotTable option.**

   If you prefer, rather than choosing a field from the drop-down list, click a part of the PivotTable while the Properties sheet is open.

The Select option changes to reflect the part of the PivotTable that you clicked.

2. **Use the Delete button (which looks like an *x*) to remove the field that appears in the Select box from the PivotTable, and the Sort buttons to sort the field.**

   The other formatting options allow you to change the text format, alignment (where in the cell the data appears — left, center, or right), font, font color, font size, number format, background color, and column width.

3. **Select the Autofit check box to select the best size for the column.**

You can also change column width without the Properties sheet, by using the drag method that you use in a datasheet.

Another formatting option that you may want to use is the `Caption` property on the Captions tab of the Properties sheet. Using the `Caption` property, you can change the label used for the field. Here's the drill:

1. **Select the label you want to change — by using the Select Caption drop-down list or by clicking the caption in the table.**

   The Properties sheet remains open.

2. **Type the new caption in the `Caption` property.**

   You can change the format of the caption too, using the formatting options.

Filtering the PivotTable data

You can filter data in a PivotTable in several ways. PivotTables can filter data, but they are set up for very simple criteria, such as excluding a single value at a time. To filter within a PivotTable, you select from a list of values. If you have a lot of data — as well as criteria that include a range of values — you may want to create criteria in a query, and then use the query data to create the PivotTable.

When you filter within the PivotTable, you can use a field in any drop area. If you don't want to use a field for the structure of the PivotTable (row, column, or data), then simply drop it in the Filter drop area, and use it only to filter the data in the PivotTable.

Every field used in the PivotTable has an arrow to display a drop-down list. Use the drop-down arrow to display a check list of displayed data — click to remove check marks for data you don't want displayed.

Filter settings are retained when you remove a field. If you remove a field and later add the field back to the layout, the same items are again hidden.

Book IV

Forms

The 5th Wave By Rich Tennant

"Ms. Lamont, how long have you been sending out bills listing charges for 'Freight', 'Handling', and 'Sales Tax', as 'This', 'That', and 'The Other Thing'?"

Contents at a Glance

Chapter 1: Designing and Using Forms (and Reports)

In This Chapter

- ✓ **Understanding and using forms**
- ✓ **Understanding the difference between forms and reports**
- ✓ **Creating a form using a wizard (the easy way)**
- ✓ **Creating a form using Design view (the way with more options)**
- ✓ **Controlling what records appear, and in what order**
- ✓ **Using your new form to enter and edit records**
- ✓ **Saving, copying, printing, importing, and renaming your forms**

Although datasheets are convenient for looking at, entering, and editing the information in tables and queries, there's a lot to dislike about them as well. Datasheets show records one per row, and if your table or query has a lot of fields, you need to scroll left and right to see all the fields. Datasheets rarely look anything like the paper forms that your information may be coming from. And datasheets display information from only one table or query at a time, even though when you enter or edit data, you may need to make changes in related tables at the same time.

Forms to the rescue! When you design your own forms to display information on-screen, you choose where fields appear, what explanatory text appears, and what lines and boxes to add. Your forms can include calculations (such as the total number of items that a customer is ordering). You can also include *subforms,* which are small forms that display information (usually more than one record's worth) from a related table or query.

After you design a form (a first draft, anyway), you can save the form design as part of your database, and you can use it any time to view the table or query with which the form is associated. You can always change the design of a form later — no one makes a perfect form the first time. This chapter describes how to make simple forms (either by using a wizard or from scratch). Chapter 2 of this minibook explains how to modify the design of a form after you create it. Chapters 3 and 4 of this minibook cover fancier forms, including forms with calculations, totals, and subforms.

Forms and Reports Are Secretly Related

This chapter describes how to make and edit forms, but it secretly also describes how to make and edit reports. Forms and reports are very similar. You *create* them with the same commands, tools, and properties to make stuff look good on-screen and on paper. But how you *use* forms and reports is different. Forms are for interacting with data on-screen, while reports are for printing data on paper.

If you need to know how to make reports, take a look at Book V, which is all about reports. But come back to this minibook, too, for the details of report layout and formatting.

Creating Forms with AutoForms and Wizards

Access provides several ways to create forms. The method you use depends on whether you want Access to do the work, whether you want complete control over what you see, or whether you want some combination of laziness and control.

You can go a long way in your form design by using a wizard — we encourage starting that way. Save the form the wizard creates, even if it's not exactly right, and then use all your know-how to gussy up the form in Design view.

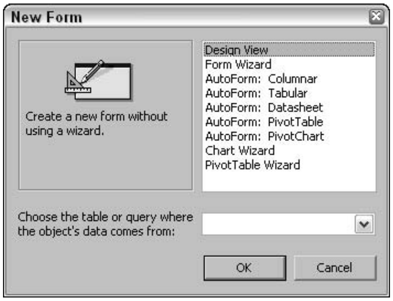
Your form creation options

As with most objects, you create forms from the Database window. Open your database and follow these steps to create a form from scratch:

1. **In the Ribbon at the top of your Database window, select the Create tab, and navigate to the Forms group.**
2. **Examine the Forms button on the Forms group of the Create tab of the Ribbon.**

   Access displays a list of the forms in this database in the left-hand menu and all open forms as tabs on the right-hand pane. If you haven't made any forms yet, you don't see much — just the Tables/Forms/Reports/Other options for creating new objects.
3. **Click the button on the Create tab of the Forms group for the kind of form you want to create on the Database window's Ribbon (see Figure 1-1).**
4. **Choose the method you want to use to create the form from the list.**

   See Table 1-1 for a summary of your options.



Create a new form without using a wizard.

Choose the table or query where the object's data comes from:

Figure 1-1: Access includes a bunch of automated form builders in the New Form dialog box.

5. **Select the table or query on which you want to base the form from the drop-down list.**

   Choose the table or query that contains most of the information on the form — the one for which the form usually displays one record at a time.

6. **Click OK.**

   The appropriate wizard or AutoForm runs, or you see a blank form in a Design view window — a Form Design View window, to be precise.

Table 1-1 Methods of Creating Forms

Options	*What It Does*	*Where to Find More Info*
Form Design	Allows you to design your own form from scratch, with a little help from View	"Creating a form (or report) from scratch," later in this chapter.
Form Wizard	Walks you through the creation of a form, helping you to choose fields from multiple tables and queries and to add summary calculations. The results are bland and standard, but you can use Design view later to make changes.	"Wizard, make me a form!" later in this chapter.
AutoForm: Form	Creates a quick and easy form for the table, query, or report you have open or selected. You enter information into this kind of form one record at a time.	"Using More Forms to create super-speedy forms," later in this chapter.
AutoForm: PivotTable	Creates a PivotTable from a single table or query. A PivotTable is an interactive table that summarizes data by multiple fields.	Book III, Chapter 4 for more on PivotTables.
AutoForm: PivotChart	Creates a PivotChart from a single table or query. A PivotChart graphically analyzes data as a bar or line chart.	Book V, Chapter 3 for more on PivotCharts.
Chart Wizard	Creates a form consisting of a chart.	Book V, Chapter 3 for more on charts.

(continued)

Table 1-1 ***(continued)***

Options	*What It Does*	*Where to Find More Info*
More Forms Modal Dialog	Creates a form that keeps the focus and must be closed to return to where you came from. It is often confused with a dialog box.	"Creating a form (or report) from scratch," later in this chapter.
PivotTable Wizard	Creates a PivotTable from multiple tables or queries.	Book III, Chapter 4 for more on PivotTables.

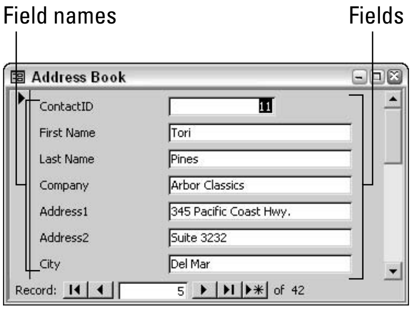
Using More Forms to create super-speedy forms

The easiest way to create a form is to use one of the predefined forms choices. You don't have a lot of options — none, actually — but you get a usable form with no waiting. Display the Database window, click the Create tab from the Objects list, select the table or query for which you want a form created, and click the More Forms button on the Ribbon to create the new form. Choose the correct button (Form, Split Form, or Multiple Items) depending on which type of form you want to create. Voilà — a form!

If you like the form, save it by clicking the Save icon (the floppy disk in the upper left-hand corner of your screen) and typing a name for the form in the Save As dialog box . (We usually name the form after the table or query whose data it displays.) If you don't like it, just close it and decline to save it when Access asks. See the section "Storing Your Forms and Reports" at the end of this chapter.

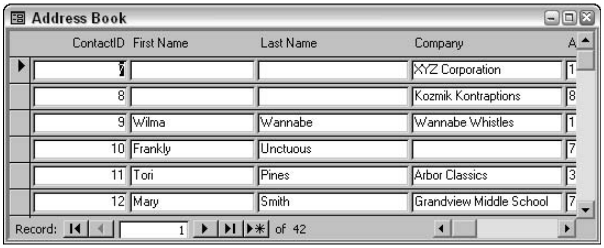
The first three types of AutoForms are the following:

- **Columnar:** You get a form with the fields arranged in a column, with the field names to the left, as shown in Figure 1-2. If Access runs out of space on-screen for your fields, it starts a second column of fields.
- **Tabular:** Access creates a form arranged like a datasheet, with records in rows and fields in columns, as shown in Figure 1-3.



ContactID 11
First Name Tori
Last Name Pines
Company Arbor Classics
Address1 345 Pacific Coast Hwy.
Address2 Suite 3232
City Del Mar
Record: 5 of 42

Figure 1-2: A Columnar AutoForm lists the fields in your table or query, one per line, in columns.



ContactID	First Name	Last Name	Company	A
7			XYZ Corporation	1
8			Kozmik Kontraptions	8
9	Wilma	Wannabe	Wannabe Whistles	1
10	Frankly	Unctuous		7
11	Tori	Pines	Arbor Classics	3
12	Mary	Smith	Grandview Middle School	7

Figure 1-3: A Tabular AutoForm looks a lot like a datasheet, but you can customize the field sizes later.

✦ **Datasheet:** Access creates exactly the same form as for the Columnar AutoForm, but displays it in Datasheet view, so it looks like a spreadsheet with one row per record. (See "Viewing a Form" later in this chapter for how to view a form in Datasheet view.)

Two other types of AutoForms, PivotTable and PivotChart Automatic Forms, are described in Book III, Chapter 4 and Book V, Chapter 3. We don't cover them here because these two views are for summarizing and graphing your data, not for entering and editing data.

Wizard, make me a form!

The Form Wizard is a step up from AutoForms — you choose which fields to include and in what order to place the fields. This wizard is especially useful if you want to create a form that includes data from more than one table or query. The wizard can create subforms for you, and even apply formatting to make the form look a little less vanilla. The Form Wizard can be a great way to get started with a complex form — you may not like the exact look of the finished form, but it works and it has all the fields you want. After the wizard finishes, you can make all the changes you want in Design view.

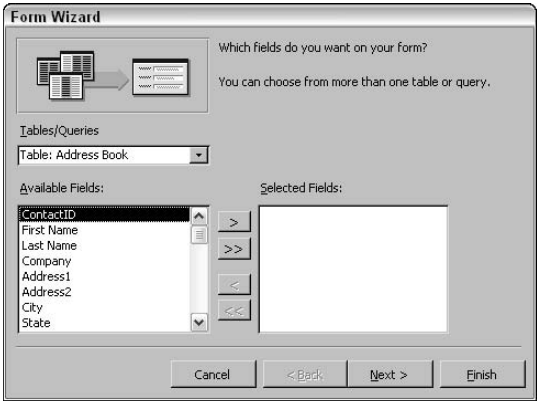
Follow these steps to create a form with the Form Wizard:

1. **Press F11 to display the Database window. Click the Create tab on the Ribbon and then the More Forms button in the Forms group.**

   Access displays a list of the forms in this database. If you haven't made any forms yet, you don't see much — just two options for creating forms.

2. **Click the More Forms drop-down list and select the Form Wizard icon to start the Form Wizard.**

   When you have launched the Form Wizard, you see the Form Wizard window, which looks like Figure 1-4.



Form Wizard

Which fields do you want on your form?

You can choose from more than one table or query.

Tables/Queries: Table: Address Book

Figure 1-4: The Form Wizard steps you through the process of creating a new form.

3. **Use the Tables/Queries drop-down list to choose the first table or query for which you want to include fields.**

   Choose the table or query from which the form gets the data to display.

4. **In the Available Fields list, select the fields that you want to appear on the form. Move them to the Selected Fields list by double-clicking them or by selecting them and clicking the right arrow (>) button.**

   The order doesn't matter. If you decide you don't want a field after all, double-click it in the Selected Fields list — or select the field and click the left arrow button (<) button — to move it back to the Available Fields list.

5. **Repeat Steps 3 and 4 to choose fields from other tables or queries.**

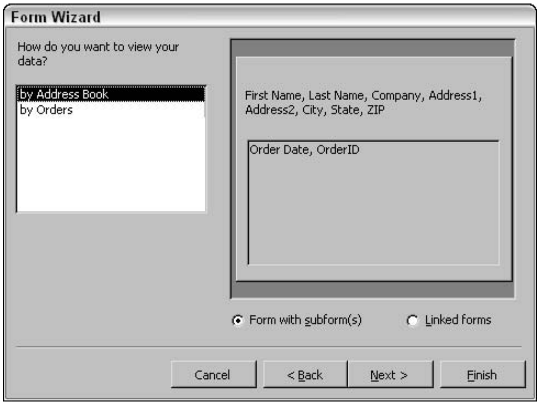
   The additional tables or queries have to be related to the first table or queries. Otherwise, Access asks you to use the Relationships window to create relationships, and you have to start the wizard over. See Book II, Chapter 6 for how to create relationships between tables.

6. **When all the fields that you want to display in the form appear in the Selected Fields list, click the Next button.**

   The Form Wizard displays the next window. If you select fields from only one table or query, skip right to Step 11. Otherwise, the window asks how you want to view your data, as shown in Figure 1-5.

7. **Choose the organization you want for your form by clicking the table or query by which you want to group records.**

   In Figure 1-5, the form includes fields from the Address Book table (which contains a record for each customer) and the Orders table (with one record for each order). Do you want the form to display one customer, with all the orders for that customer? Or do you want to display one order, with all its customers? (The second option makes no sense, because each order is placed by only one customer.) You decide, by clicking an option from the list on the left side of the wizard's window.



How do you want to view your data?

by Address Book
by Orders

First Name, Last Name, Company, Address1, Address2, City, State, ZIP

Order Date, OrderID

◉ Form with subform(s) ○ Linked forms

Figure 1-5: The Form Wizard can create a form with a subform for information from a related table or query.

8. **Choose whether to include the second table or query as a subform or as a second form.**

   If you choose the Form with Subforms option, you end up with one form, with the records from the second table or query in a box (subform) on the form. If you choose the Linked Forms option, you get two separate forms, each in its own window, with a button on the first form to display the second form. When in doubt, try subforms (see Chapter 3 of this minibook for how subforms work).

9. **Click Next.**

   Access displays a window that asks you to choose the layout for the subform, if you're creating one. Otherwise, skip to Step 11.

10. **Choose the layout and click Next.**

    You can click a layout option to see what it looks like. If you're not sure which option to use, stick with the Tabular layout — using and editing the layout is easy.

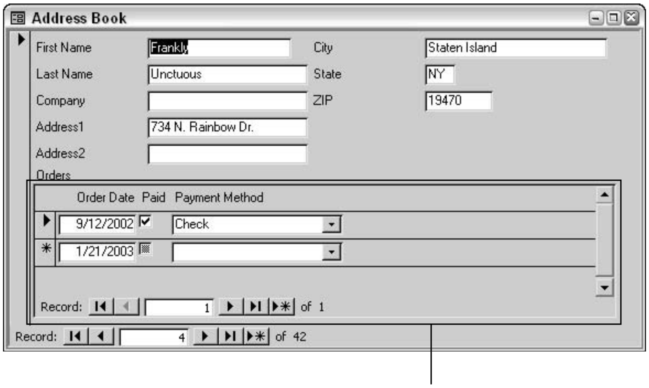
11. **Choose the style for the form and click Next.**

    Click a style to see a sample of a form formatted with that style. None of the styles are gorgeous (in our humble opinions), so pick one and plan to fix it up later in Design view.

12. **Give the form a name in the last window. If you created a subform or second form, give it a name, too. Choose whether to open the form now (in Form view) or to make changes to the form design (in Design view). Then click Finish to create the form.**

    Why not open it first, to see how it looks? You can always edit the design later.

Figure 1-6 shows a form with a subform as created by the Form Wizard.



Address Book

First Name	Frankly	City	Staten Island
Last Name	Unctuous	State	NY
Company		ZIP	19470
Address1	734 N. Rainbow Dr.		
Address2			

Orders

Order Date	Paid	Payment Method
9/12/2002	☑	Check
1/21/2003	▨	

Record: 1 of 1

Record: 4 of 42

Subform

Figure 1-6: A sample form created by the Form Wizard.

When you're done admiring your new form, close it with the Close button. To change its design, see Chapter 2 of this minibook.

Viewing a Form

After you create a form, you can open it in any of three views. When the form is open, you can switch views by clicking the Views drop-down box on the Views group on the Home tab of the Ribbon. The View button changes depending on which view you're in. The three views (and their icons on the View button) are

- **Form view** displays the form as you (or the Form Wizard or AutoForm) designed it, as shown in Figure 1-6.
- **Datasheet view** displays the fields from the form as a datasheet, just as if you were looking at a table or query. The datasheet includes only the fields included on the form, in the same order as on the form, even if your table includes additional fields.
- **Design view** displays the Design View window, in which you can move form elements around, change them, add them, and delete them, as described in the next section.

When you open a form, you can open it in Layout or Design view by right-clicking the form name in the Database window (press F11 if it's not visible) and clicking the Layout button or the Design button.

When a form is already open in any view, you can switch among the views by right-clicking the title bar of the form. Choose the view you want.

The View button provides different possible views depending on what type of object you're working on. The views available for tables and queries are different from those for forms.

When you're in Design view, the default for the View button is Form view, and when you're in Form view, the default is Design view. If you want to switch back and forth between Form and Design views (to make changes to your form and then see the results), just click the View button.

Creating Forms (and Reports) in Design View

As you work with forms, you'll find yourself using Design view in two situations: to create a form from scratch, and to change the layout of an existing form. Either way, you see controls — the objects on the form that tell Access what to display.

The information in this section (and most of the rest of the sections in this chapter) works for creating and editing reports, too. Just substitute the word "report" for "form" and give it a try!

Creating a form (or report) from scratch

To create a new form using Design view, follow these steps:

1. **Press F11 if the Database window isn't visible, and then click the Forms button on the Objects list in the Database window.**

   To make a report, click the Reports button.

2. **Click the New button on the Database window toolbar.**

   You see the New Form dialog box (refer to Figure 1-1). If you're making a report, it's the New Report dialog box, but it works the same way.

3. **Choose the Design View option from the list.**

   Chances are, it's already selected.

4. **From the drop-down list, choose the table or query that contains the fields you want to display on this form.**

5. **Click OK.**

   You see a blank form (or report) in Design view, as shown in Figure 1-7. (The Property sheet and Field list may not appear — yet.) After you create the form, you're ready to add controls to it, as explained in the section "Changing the layout of an existing form or report," later in this chapter.

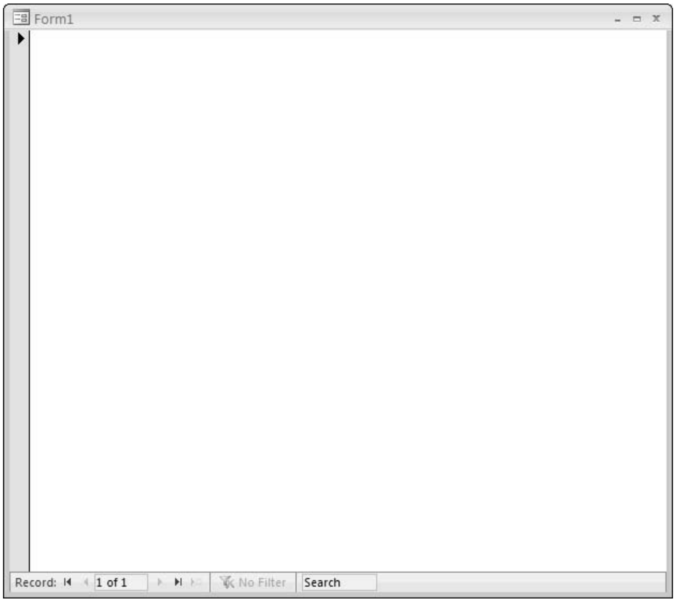


Figure 1-7: A blank form in Design view.

WARNING!

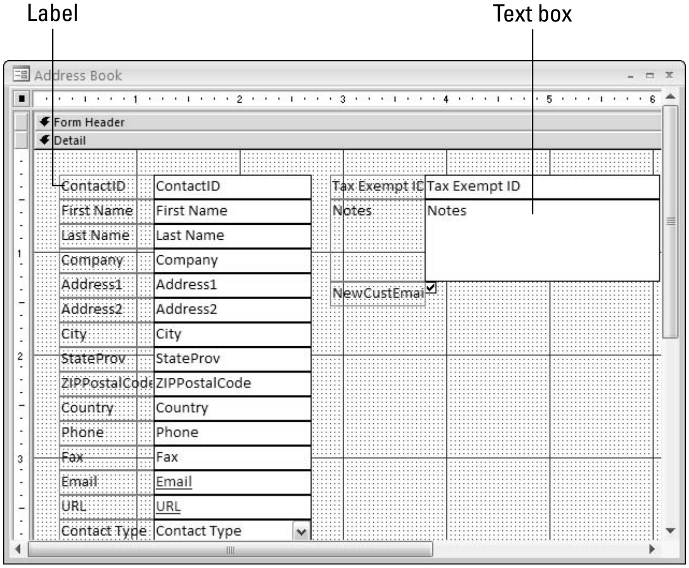
You'd think that another easy way to start a form in Design view would be to click the Create Form in Design View icon in the list of forms in the Database window. However, this method doesn't allow you to select the table or query on which you want to base the form. If you create a form this way, you need to select the table or query that has the data, as described in the section "Where records come from," later in this chapter, before you click the Create Form button in the Design View group that is located on the Create tab of the Ribbon.

Changing the layout of an existing form or report

To change the layout of an existing form or report, first put it in Design view by clicking its name in the Database window and clicking the Views drop-down list button on the Views group of the Home tab on the Ribbon.

Design view shows the controls that make up your form or report, and enables you to create, move, and delete the controls. You can also set the properties of your controls to change how they look and act.

We can hear you asking, what's a control? A *control* is an object on a form or report that displays some information. Some controls display text, while others display check boxes, command buttons, drop-down menus, or pictures. You choose what information appears on your form or report by making controls to display that information. Figure 1-8 shows some of the all-time most popular controls: a text box (to show text, usually from a field in your table), a label (to show explanatory text), a combo box (to show a drop-down menu), and a command button (to run a little program, either a macro or a VBA module). Chapter 2 of this minibook includes a list of other types of controls.



ContactID	ContactID
First Name	First Name
Last Name	Last Name
Company	Company
Address1	Address1
Address2	Address2
City	City
StateProv	StateProv
ZIPPostalCode	ZIPPostalCode
Country	Country
Phone	Phone
Fax	Fax
Email	Email
URL	URL
Contact Type	Contact Type
Tax Exempt ID	Tax Exempt ID
Notes	Notes
NewCustEmai	☑

Figure 1-8: Controls on a form in Design view.

Other things you may see in Design view are the following:

- **Grid:** Access displays a grid of lines and dots in the background of the Design View window to help you align objects neatly, as well as rulers at the top and left of the window. Figure 1-8 shows the grid.
- **Design tab:** The Controls group on the Design tab of the Ribbon (viewable when a form is open in Design view) contains a button for each type of control you may want to create (refer to Figure 1-9 for what it looks like). See Chapter 2 of this minibook for what each button does.

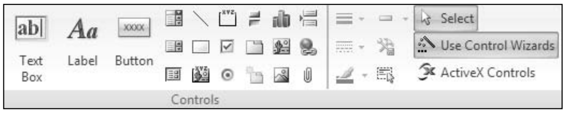


Figure 1-9: The tools of the Controls group on the Design tab of the Ribbon.

- **Field list:** This floating window shows a list of the fields in the table or query that this form or report is based on (refer to Figure 1-8). You use it when creating a new control to display a field from your table or query. Display the Field list by clicking the Add Existing Fields button on the Tools group of the Design tab of the Form Design Tools Ribbon.

- **Property sheet:** This window (shown in Figure 1-10) displays the properties of the selected object, which can be the whole form or report, a section of the form or report, or an individual control. Tabs display the different types of properties. The properties listed depend on the type of object that you select. Click the All tab to see all the properties of the selected item in one long list.

  Display the Property sheet by clicking the Property Sheet button in the Tools group on the Design tab of the Ribbon. To change which control's properties display, you can choose another control name from the drop-down list at the top of the Property sheet. You can also move and size the Property sheet.

Configuring the Whole Form or Report

Some properties apply to an entire form, such as what records appear in the form or report, how many records appear at the same time, and what scroll bars and buttons appear around the edges. This section explains how to set these form and report properties, and why you'd want to.

CROSS-REFERENCE

Reports have additional properties and sections, which are described in Book V, Chapter 1.

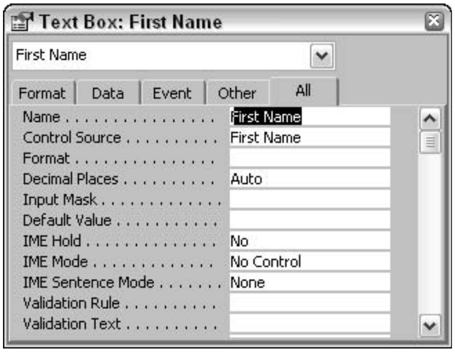
Follow these steps to display the properties that apply to the whole form or report:

1. **To select the entire form or report, click in the upper-left corner of the Design View window, in the little box where the two rulers intersect.**

   Refer to Figure 1-8 to see where this box is.

2. **If the Property sheet isn't already open, click the Property Sheet button in the Tools group of the Design tab on the Ribbon to display it.**

   Refer to Figure 1-10 to see the Property sheet.



First Name

Name	First Name
Control Source	First Name
Format	
Decimal Places	Auto
Input Mask	
Default Value	
IME Hold	No
IME Mode	No Control
IME Sentence Mode	None
Validation Rule	
Validation Text	

Figure 1-10: The properties of a control.

Here are two other ways to see the properties of the whole form or report:

- Double-click the gray area behind the grid.
- If the Property sheet is already open, choose Form or Report from its drop-down list.

The next few sections describe the most useful form and report properties.

Where records come from

When you created your form or report, you probably chose the *record source* — the table or query that provides the records to display. You rarely want to change the record source — if you want to use different data, you may as well start with a new form or report. An exception would be if you decide to use a query to sort or filter the data, but you're still displaying the same fields. To see or change the record source, open the form or report in Design view, display its properties, and follow these steps:

1. **Click the Data or All tab in the Property sheet.**

   Either way, the first property listed is the `Record Source` property. It shows the name of the table or query from which the form or report displays records.

2. **If you want to change the record source to a different table or query, click the down-pointing triangle button at the right end of the `Record Source` property and choose a different table or query from the list that appears.**

   If the form or report is based on a query and you want to modify the query, click the Expression Builder button (the ... button to the right of the `Record Source` property). (See Book III for the details of how queries work.)

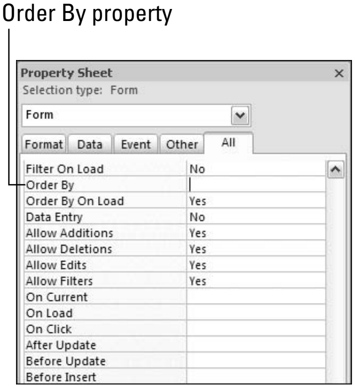
WARNING!

If you're going to change the record source, do it *before* you spend a lot of time working on the design of the form. Having the correct record source makes creating and editing your form or report much easier, because Access already knows what fields may appear on it (the fields from the record source you choose appear in the floating Field list, making them easy to drag to the Design View window).

Deciding the order of the records

You can also control the order in which records appear. You may want to browse through your address book by last name or by city. Normally, Access displays the records in the same order as the record source. If the record source is a table, records appear in primary-key order from that table. If the record source is a query, records are in the sort order specified in the query.

However, you can change the order of the records by changing the Order By property of the form or report, which appears on the Data tab of the Property sheet. Type the field name into the `Order By` property (refer to Figure 1-11). If you want the records to appear in reverse order, type a space and DESC after the field name (for descending order).



Order By property

Property Sheet
Selection type: Form

Form

Filter On Load	No
Order By	
Order By On Load	Yes
Data Entry	No
Allow Additions	Yes
Allow Deletions	Yes
Allow Edits	Yes
Allow Filters	Yes
On Current	
On Load	
On Click	
After Update	
Before Update	
Before Insert	

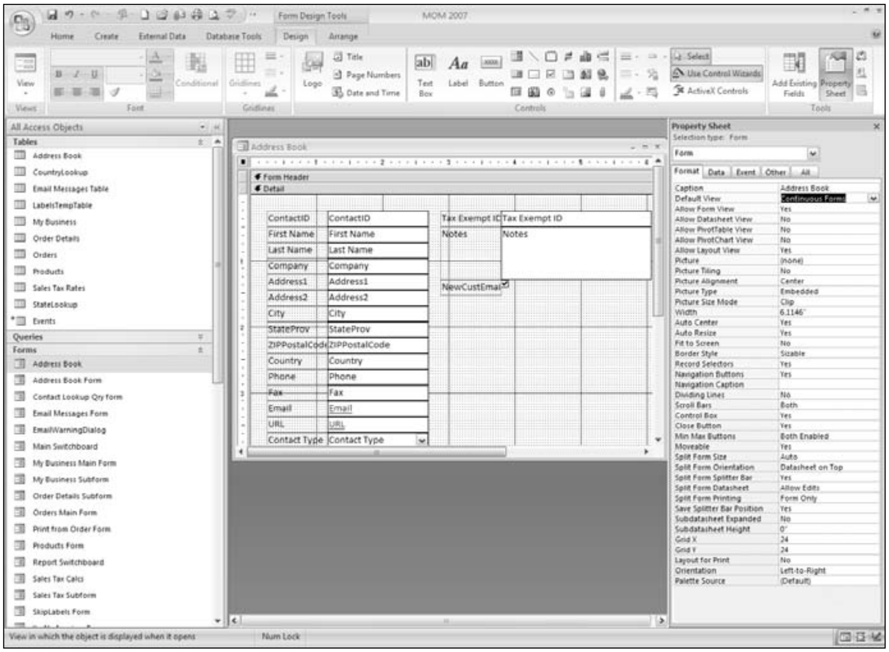
Figure 1-11: The `Order By` property in the Property sheet.

One record or many?

You usually want your form to show only one record at a time, like a paper form. Most forms display one record at a time. For example, the Address Book form in the MOM database displays one record from an Address Book table. But sometimes you want to see more than one record at a time, as in the form in Figure 1-12. (Reports use a different system to determine whether one or many records appear on the report, as described in Book V, Chapter 1.) To accomplish the display of more than one record at a time, you can make a simple change to the form's Default View property. To display one record at a time, you set this property to Single Form; to display multiple records, you change this to Continuous Forms. The following list shows you what each option in this property's drop-down list does.

A form's Default View property determines whether the form displays one or several records. Display the form properties, click the Format tab of the Property sheet, and look at the second property, Default View. The first three options are

- **Single Form:** Displays one record at a time. This setting is the default.
- **Continuous Forms:** Repeats the form for as many records as fit in the window, as shown in Figure 1-12.
- **Datasheet:** Displays a datasheet with the same fields that are included on the form. This option is used primarily for subforms, which are described in Chapter 3 of this minibook.



Property Sheet

Selection type: Form

Form

Format | Data | Event | Other | All

Caption	Address Book
Default View	Continuous Forms
Allow Form View	Yes
Allow Datasheet View	No
Allow PivotTable View	No
Allow PivotChart View	No
Allow Layout View	Yes
Picture	(none)
Picture Tiling	No
Picture Alignment	Center
Picture Type	Embedded
Picture Size Mode	Clip
Width	6.1146"
Auto Center	Yes
Auto Resize	Yes
Fit to Screen	No
Border Style	Sizable
Record Selectors	Yes
Navigation Buttons	Yes
Navigation Caption	
Dividing Lines	No
Scroll Bars	Both
Control Box	Yes
Close Button	Yes
Min Max Buttons	Both Enabled
Moveable	Yes
Split Form Size	Auto
Split Form Orientation	Datasheet on Top
Split Form Splitter Bar	Yes
Split Form Datasheet	Allow Edits
Split Form Printing	Form Only
Save Splitter Bar Position	Yes
Subdatasheet Expanded	No
Subdatasheet Height	0"
Grid X	24
Grid Y	24
Layout for Print	No
Orientation	Left-to-Right
Palette Source	(Default)

Figure 1-12: An Address Book form showing the change to show Continuous Forms in the Property sheet.

The last two options, PivotTable and PivotChart, are described in Book III, Chapter 4 and in Book V, Chapter 3.

Some other cool form properties

A few other useful form properties appear on the Property sheet for the form. Here's what they do:

- **Title bar text:** The `Caption` property, which appears on the Format tab, controls the text that appears in the title bar of the form. Normally, the title bar shows the same name as the form, but you can change this.
- **Scroll bars and navigation buttons:** Normally forms include horizontal and vertical scroll bars if the form is too large to fit in the window. You also see navigation buttons to move to the first, previous, next, and last records. You can turn the scroll bars and navigation buttons on and off using the `Scroll Bars` and `Navigation Buttons` properties, both of which appear on the Format tab.
- **Record selectors:** A gray box — the record selector — appears to the right of the information for one record. When you're editing records using your form, you can delete or copy a record by clicking its record selector and pressing the Delete key or Ctrl+C. You can control whether the record selectors appear on the form by setting the form's `Record Selectors` property, which appears on the Format tab.

- **Read-only forms:** You can make the information in a form *read-only* — that is, not editable (look, but don't touch!) — by setting the `Allow Edits` property, which appears on the Data tab. This property is normally set to the `Yes` value, but you can change it to the `No` value. You can prevent adding new records by setting the `Allow Additions` property to the `No` value, and you can prevent deletions by setting the `Allow Deletions` property to the `No` value.

Sizing Forms

How big will your form look on-screen? You can control two sizes: the height and width of the form itself, and the height and width of the window in which it appears.

To adjust the size of the form itself, drag the right and bottom edges of the form up, down, left, or right in the Design View window. You can't make the form smaller than the area that the controls occupy. We usually start with a large form, leaving lots of room to move things around, and then snuggle the controls closer together near the end of the design process, shrinking the edges of the form to match.

You adjust the size of the window in Form view. (You can adjust it in Design view, but it's easier in Form view.) Switch to Form view and drag the window borders. When you save the design of the form, you save the size of the window, too.

If a form is too large to fit in its window, consider creating tabs, as described in Chapter 3 of this minibook.

The size of the window doesn't matter for reports, because it doesn't affect how the report looks when it's printed. The size of the report itself *does* matter, because the report needs to fit on your paper. See Book V, Chapter 2 for how to fit a report to the paper on which it can print.

Storing Your Forms and Reports

You spend oodles of time and energy getting your form or report looking just right. You don't want to lose all that hard work, do you? Save your form or report by clicking the Save button on the toolbar or pressing **Ctrl+S.** When Access displays the Save As dialog box, type a name. This name usually appears in the title bar of the form, although you can change this. (See the "Some other cool form properties" section, earlier in this chapter, for a look at how.)

When you're done designing your form or report (or you're done for now, anyway), close it by clicking its Close button (the X in the upper-right corner). If you haven't saved it, Access asks whether you want to do so.

You can display the form or report any time from the Database window — click the Forms or Reports button in the All Access Objects list and then double-click the name. If you want to change the design some more, right-click the name and click the Design button.

Form and report management

You can rename, delete, and copy forms and reports from the Database window, too. To rename one, click its name, press F2, edit the name in the little box that appears, and press Enter. To delete it, select the name and press the Delete key. And to copy it, select its name, press Ctrl+C, press Ctrl+V, and type a name for the new copy.

Importing forms and reports from other databases

What if you create a terrific form or report in one database and you want to use the same one in another database? You can import a form or report from another Access database:

1. **Choose External Data➪Import➪Access to display the Import Objects dialog box.**
2. **Choose the name of the database file (either browse for it or type the path in), select Import tables, queries, forms, reports, macros, and modules into the current database, and click OK.**

   You see the Import Objects dialog box (shown in Figure 1-13).

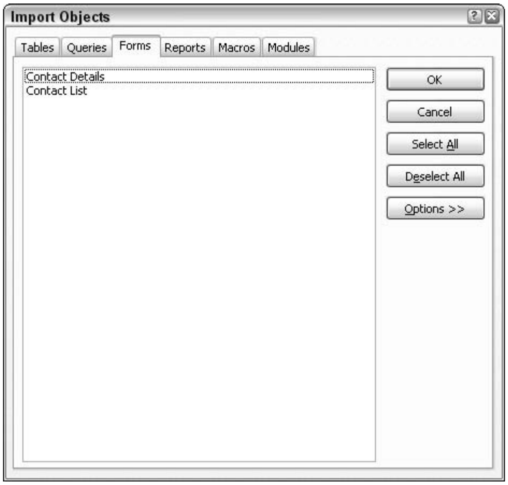


Figure 1-13: Import Objects dialog box.

3. **Click either the Forms tab or the Reports tab.**

4. **Choose the form (or forms) or report (or reports) you want to import.**

   You can select a group of items by clicking the first one and Shift+clicking the last. You can add a form or report to the ones you already selected by Ctrl+clicking it.

5. **Click OK.**

   If you already have an object of the same type with the same name, Access adds a 1 to the end of the name.

Read Chapter 2 of this minibook if you want to add controls to your forms. Chapter 3 of this minibook describes advanced controls such as drop-down menus, sets of radio buttons, and subforms. If you're creating reports, jump to Book V.

Editing Data Using Forms

After you design and create your form, you can enter, edit, and display records. To open a form in Form view, double-click its name in the Database window. The data that a form displays comes directly from tables in the database, and any changes you make are stored in the tables. When you add a record via a form, Access stores the record in the table(s). If your form has subforms, as described in Chapter 3 of this minibook, you can edit records from several tables at the same time.

In general, you use all the same keystrokes you use when editing records in Datasheet view, as described in Book II, Chapter 2. You can also use the navigation buttons at the bottom of the form to move to different records, and you press Tab or Enter to move from one field to another.

If you prefer to use the keyboard to move around a form, the keys to use and where they move the cursor are listed in Table 1-2.

Table 1-2 Using the Keyboard to Move in a Form

To Move Here in a Form. . .	*Press This Key*
Following field	Tab, Enter, or →
Previous field	Shift+Tab or ←
First field of current record	Home
Last field of current record	End
Subform	Ctrl+Tab
Main form	Ctrl+Shift+Tab
New record	Ctrl+(+) (Plus sign)

You can cut and paste, search, and filter your records just as if you were working in Datasheet view, as described in Book II, Chapter 3. To select an entire record, click the record selector (the gray box at the left edge of the window). You can cut and paste a record from another table into your form as long as the field names match: For all the fields with matching names, Access pastes the data into the correct field on the form.

Saving your data

Access saves the record when you move to another record. You can also save what you typed so far by pressing Ctrl+S, choosing the Microsoft Office button➪Save, or clicking the Save button on the toolbar.

Printing forms

Forms aren't designed to be printed — reports are the Access objects that give you the most printing and formatting options — but you can print them anyway. However, don't just click the Print button on the toolbar when you're using a form in Form view. Instead of printing just the record you're looking at, Access prints the form for every single record in the table or query, not just the record you're viewing!

One method of printing the form for just the current record is to apply a filter to select only the current record, and then click the Print button. Be sure to remove the filter before trying to move to any other records.

Book II, Chapter 3 explains how to create, apply, and remove a filter. Book VI, Chapter 2 describes how to create a command button on your form that prints just the current record.

Chapter 2: Jazzing Up Your Forms (and Reports)

In This Chapter

- **Creating new controls on your form (or report)**
- **Adding controls to display text, numbers, dates, and Yes/No fields**
- **Spiffing up your form with lines and boxes**
- **Arranging and formatting the controls on your form**
- **Controlling how the cursor moves from field to field when you use the form**

Chapter 1 of this book explains how to make a form or report by using either a wizard or your bare hands. In this chapter, you find out how to create controls — the objects on the form (or report) that actually display information. You use controls to add lines, boxes, and pictures to forms, too. You use Design view to fool around with your form (or report) and make it as clear and easy to use as possible.

The basic system is as follows:

1. **Switch to the Database window and click the Forms or Reports drop-down list in the All Access Objects list on the left.**

   If the Database window isn't visible, press F11.

2. **Open the form or report in Design view by selecting its name from the list on the left and clicking the View button on the Home tab of the Ribbon. Select Design View from the resulting drop-down list.**

   See Chapter 1 of this minibook for an explanation of the items that you see in Design view.

3. **Make a change — add a control, change an existing control, turn the background purple, or whatever.**

   Read on to find out how to make all kinds of specific changes.

4. **To see how your form looks with the change, switch to Form view by clicking the View button on the View group of the Home tab of the Ribbon.**

   When the Design tab is selected, the View button on the Ribbon shows a tiny form — it defaults to Form view. Clicking the View button when it's in tiny-form-mode tells Access to display your form in Form view — including a record from the table or query that the form is based on — so you can see whether you made the form better or worse. (See Chapter 1 of this minibook for the views available for forms.)

   For reports, you may often want to preview what the report will look like after it is printed. To do this, click the Office Button with a report in Design view and roll your mouse over the Print link. Click the Print Preview link to display the Print Preview tab on the Ribbon. (Figure 2-1 shows a good example of this.) The result allows you to see how the report will look on paper.

5. **Switch back to Design view by clicking the View button again.**

   When you're in Form view (or Print Preview of a report), the View button shows a triangle, ruler, and pencil (which you maybe use if you create a paper form by hand!), which is the Access icon for Design view.

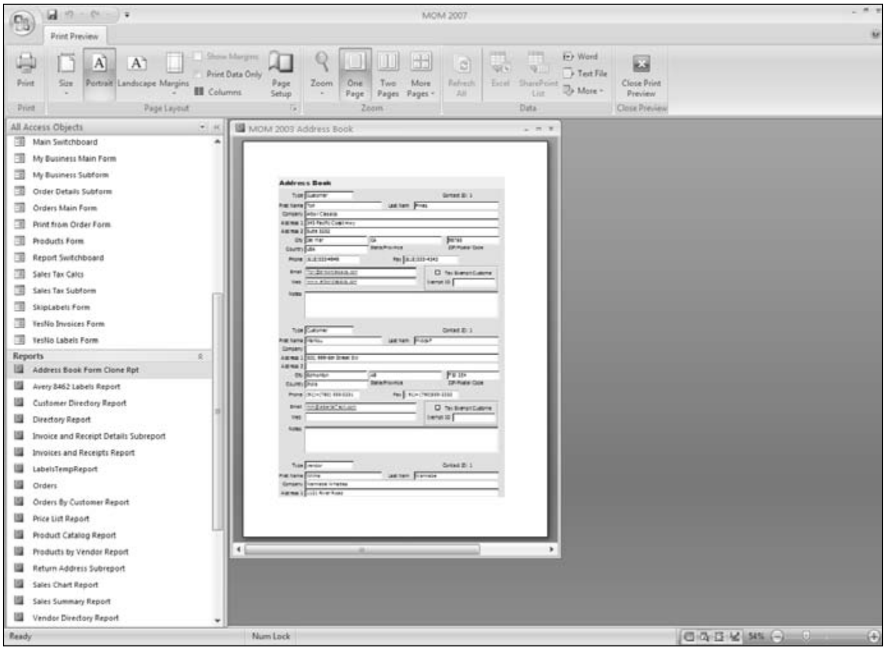


Figure 2-1: The available Print Preview options.

6. **Repeat Steps 3 through 5 until your form or report is gorgeous and works perfectly.**

   Be smart: Click the Save button on the toolbar every few minutes to save your work, even before you're completely finished.

7. **Close the form's or report's window (it doesn't matter whether you're in Design view, Form view, or Print Preview). If you haven't saved the form or report recently, Access asks whether you want to do so now — click the Yes button.**

Taking Control of Your Form or Report

The heart of form design is the *controls* — the objects that appear on forms and reports. Controls on forms include boxes that display text and numeric data from fields, check boxes for Yes/No fields, drop-down menus for lookup fields, buttons you click to run a macro or VBA procedure, and other stuff you're used to seeing on computer screens. (On reports, all controls just sit there on the paper.)

To display or edit a field, you have to create a *bound control* — a control that is connected to a field in your table or query — so Access knows what information to display in the control. You can also display *unbound controls* that contain information that's not stored in your table or query, such as the form's title or explanatory text.

TIP

Form and report design tips

When designing your form, keep the following design tips in mind for perfect, or at least tasteful, forms:

- **Make sure that the Snap To Grid feature is turned on.** This feature tells Access to make all the edges of your controls line up with the grid that appears in Design view, which makes your form or report look neater. To turn this feature on, with the report open in Design view, click the Arrange tab from the Ribbon and see whether the Snap to Grid button appears to be selected in the Control Layout group. If it doesn't appear to be selected, the feature is turned off: Click the Snap to Grid button to turn the feature on.
- **Before you make any big changes to your form or report, be sure to save it (by clicking the Save button on the toolbar or by pressing Ctrl+S).** If you want to be double-sure, save it with a different name (like "Address Book Test") and fool around with the big change you're planning to make on the copy. Either way, if you don't like the results, close the modified version without saving it.
- **If you make a change and you're instantly sorry, press Ctrl+Z or choose Undo (the button with the backward curvy arrow) in the Quick Access toolbar to reverse your change.** Whew!

Designing a form or report (or changing the design of an existing one) consists mainly of adding controls where you want them to appear, getting rid of controls you don't like, and moving or configuring the controls that you've got.

Form control types

Table 2-1 lists the types of controls that can appear on forms and reports when the report is open in Design view, along with the buttons on the Design tab that create each type of control. As with any button, hover the mouse pointer over a button to see the button's name.

To display the Toolbox window if it's not already on-screen, open a form in Design view and the Form Design Tools will appear on the Ribbon. You can choose the Design or Arrange tabs. Figure 2-2 shows this new section of the Ribbon.

The first three groups on the Ribbon don't create controls:

- **Views:** This button will allow you to toggle between different views of this form.
- **Font:** This group will allow you to change the font of the tabs associated with the controls.
- **Gridlines:** This group controls the appearance of the gridlines on the Design view.

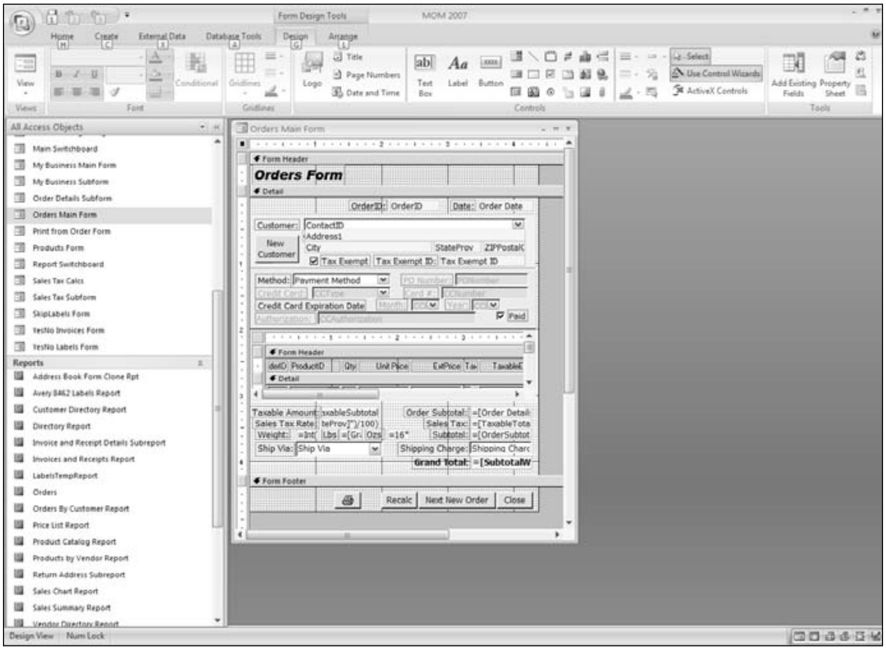


Figure 2-2: The Form Design Tools on the Ribbon.

Table 2-1 Types of Controls on Forms

Toolbox Button	*Control Type*	*Description*
Aa Label	Label	Text, not editable — hyperlinks are special types of labels (see the sidebar “It’s a link!”)
ab| Text Box	Text Box	Contents of a field
XYZ	Option Group	Group of option (radio) buttons, check boxes, or toggle buttons
	Toggle	Button that is either on (pressed) or off (not pressed)
◉	Option Button	Option (radio) button that is part of an option group
☑	Check Box	Box that contains or doesn’t contain a check mark
	Combo Box	Drop-down menu from which you can choose an option or type in a new one
	List Box	Drop-down menu from which you can choose an option, but you can’t type new values
xxxx Button	Command Button	Button that performs an action when clicked
XYZ	Image	Bitmap picture
	Unbound Object Frame	OLE or embedded object (graph, picture, sound file, or video) that is not stored in a field in a table
	Bound Object Frame	OLE or embedded object (graph, picture, sound file, or video) that is stored in a field in a table
	Page Break	Division between one form page and the next
	Tab	A tab for displaying different controls (like those at the top of Controlmany dialog boxes)
	Subform/ Subreport	Adds a subform or subreport to the form
╲	Line	A line, for visual effect
□	Rectangle	A rectangle, for visual effect

Making a new control

Making most forms and reports consists mainly of setting up the bound controls to display the fields from the record source (table or query). Access makes this easy, with a quick drag-and-drop procedure. With your form open in Design view, follow these steps to create a bound control:

1. **If the Field list isn't already displayed, display it by clicking the Add Existing Fields button in the Tools group of the Design tab on the Ribbon. Figure 2-3 shows you the selection and the resulting Field list.**

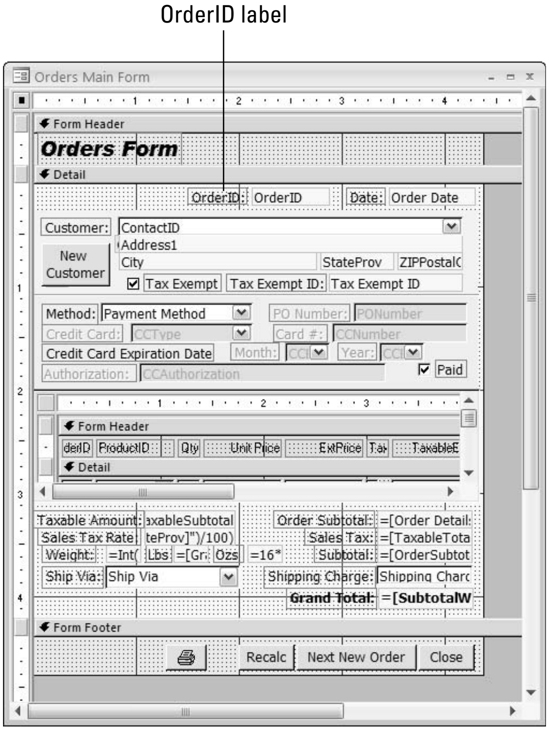

OrderID label

Figure 2-3: Displaying Field lists.

You see a list of the fields in your table or query. If your form or report doesn't have a record source, or the fields look like the wrong ones, see Chapter 1 of this minibook.

2. **Drag the field from the Field list to the Design View window, dropping it where you want a control for that field.**

   Access creates a control (usually a text box) and a label control. The label control contains the name of the field, followed by a colon. The text box (or other control) is where the contents of the field will appear.

The Field list helps you create a control for your field, but you don't get to decide what kind of control to make. If you don't like what the Field list provides, or if you want to create an unbound control (one that doesn't display a field from the Field list), there is another way to create controls. To make any kind of control using the Controls group in the Design tab on the Ribbon, follow these steps:

1. **Click the appropriate Controls button for the type of control you want.**

   The chosen Controls button turns a different color and has a box around it, so you know it's selected.

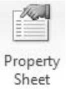
2. **Click the place in the Design View window where you want the control to appear.**

   Access creates a new control, and for some control types, runs a wizard to help you configure it.

Whether you use the Field list or the Controls to create a control, you usually need to configure it by setting its properties on the Property sheet, as shown in Figure 2-4. You can change the text of a table control, change the field that a text box control displays, make text bold, huge, or a different color, and other changes. The rest of this chapter describes how to configure your controls. In the figure, you will notice that you can change the properties of any of the components of the form, from text box properties to the background color of the form itself.

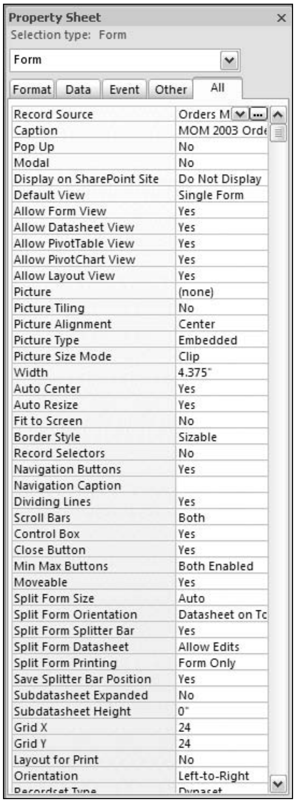
This chapter tells you everything you need to know about making and configuring text boxes, labels, and check boxes, along with drawing lines and boxes on your form. The next chapter of this book describes how to create and configure more advanced controls, including combo boxes, list boxes, toggle buttons, option groups (of radio buttons), and command buttons.

Setting control properties



After you create a control on a form or report, you can change what information the control displays, how the control looks, and how the control acts by changing its properties. To see or change a control's properties, display the Property sheet (by clicking the Property Sheet button in the Tools group on the Design tab of the Ribbon) and then click the control in Design view or choose the control's name from the drop-down list at the top of the Property sheet. (In Figure 2-4, the Property sheet displays the properties of the Orders Main Form.)

Advanced form designers can make macros run when users move the cursor in or out of the controls on the form. (See Book VI for how to create macros and connect them to form events.)

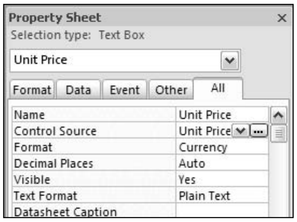


Record Source	Orders M
Caption	MOM 2003 Orde
Pop Up	No
Modal	No
Display on SharePoint Site	Do Not Display
Default View	Single Form
Allow Form View	Yes
Allow Datasheet View	Yes
Allow PivotTable View	Yes
Allow PivotChart View	Yes
Allow Layout View	Yes
Picture	(none)
Picture Tiling	No
Picture Alignment	Center
Picture Type	Embedded
Picture Size Mode	Clip
Width	4.375"
Auto Center	Yes
Auto Resize	Yes
Fit to Screen	No
Border Style	Sizable
Record Selectors	No
Navigation Buttons	Yes
Navigation Caption	
Dividing Lines	Yes
Scroll Bars	Both
Control Box	Yes
Close Button	Yes
Min Max Buttons	Both Enabled
Moveable	Yes
Split Form Size	Auto
Split Form Orientation	Datasheet on Tc
Split Form Splitter Bar	Yes
Split Form Datasheet	Allow Edits
Split Form Printing	Form Only
Save Splitter Bar Position	Yes
Subdatasheet Expanded	No
Subdatasheet Height	0"
Grid X	24
Grid Y	24
Layout for Print	No
Orientation	Left-to-Right
Recordset Type	Dynaset

Figure 2-4: The Property sheet for a text box.

The most important property of most controls is the `Control Source` property, which tells Access what information to display in the control. The `Control Source` property is usually a field in a table or query that is the record source for the form. For example, if a form's record source is the Products table in an order entry database, one text box may have the `Product Code` field as its control source — the text box displays the contents of the `Product Code` field in the current record of the Products table.

A control's name is usually the same as its control source, but not always. You can have a text box named TextBox123 for which the control source is the `Selling Price` field in the Products table. Naming your controls with the same names as the fields that they display is good practice, though, and cuts down on the confusion. When you drag a field from the Field list to the Design View window, Access usually names the new control after the field that it displays. In Figure 2-5, for example, the Unit Price text box has the `Unit Price` field as its control source.



Property Sheet

Selection type: Text Box

Unit Price

Format | Data | Event | Other | All

Name	Unit Price
Control Source	Unit Price
Format	Currency
Decimal Places	Auto
Visible	Yes
Text Format	Plain Text
Datasheet Caption	

Figure 2-5: Property sheet for Unit Price Text Box.

Making Controls That Display Text

Face it: The most important information on most forms and reports is text. Pictures are interesting, but text is usually where the heart of the matter is. Access has several types of controls that display text on forms and reports:

- Label controls display fixed text — text that isn't based on the record that you're displaying on the form.
- Text box controls display information from fields in the record source of the form, or calculated information.
- List box and combo box controls display drop-down menus of values, usually for a field in the record source.

This section describes how to create and format labels and text boxes. For combo and list boxes, see Chapter 3 of this minibook.

Making and editing labels

Every form has a title in the title bar of its window, which you can set by editing the `Caption` property of the form (as described in Chapter 1 of this minibook). But you may want some other titles on the form, including explanations of how to use the forms, headings for different sections of the form, or labels that apply to the controls for specific fields. Labels are unbound fields (they don't take their information from a table).

CROSS-REFERENCE

For reports, you use labels wherever you want to display text that doesn't come from the record source — such as the report title, the date, instructions, or any other text that's not stored in a table. (For more formatting options that are available on reports, see Book V, Chapter 1.)

To make a label, follow these steps:

1. **Click the Label button on the Controls group of the Design tab of the Ribbon.**
2. **Click and drag in the Design View window to create a box the right size and position for your label.**

Don't worry — you can always move and resize it later.

3. **Type the text that you want to appear in the label and press Enter.**

   If you want more than one line of text to appear in the label box, press Ctrl+Enter to start a new line.

Figure 2-6 shows a label that says "Order ID." When you create a label control, you may see a little error symbol — an exclamation mark in a yellow diamond. Access thinks that you may have made a mistake: Are you sure that you don't want this label to be associated with another control? Most labels are associated with text boxes or other controls, to provide a visible name or prompt for that control.

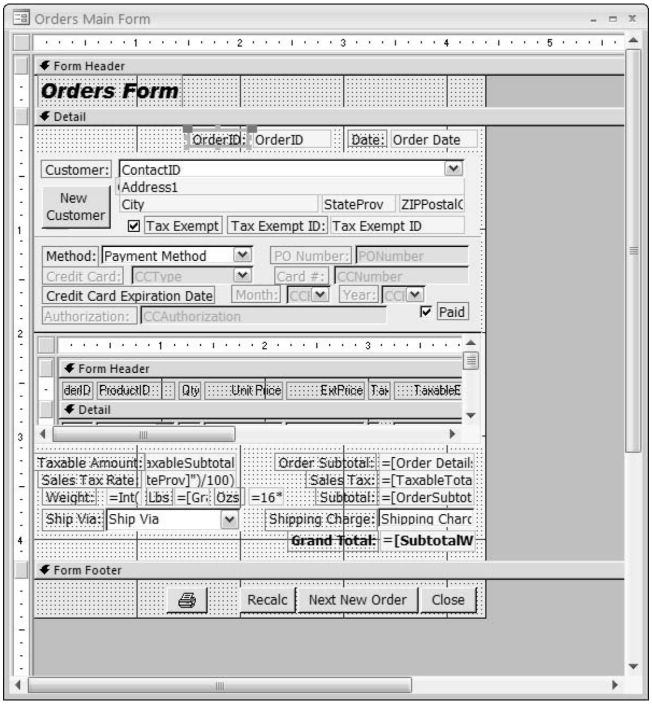


Figure 2-6: The Order ID label.

If you see the error warning icon, click it to see your options. The first item on the shortcut menu that appears is the name of the error (in this case, New Unassociated Label). If the label isn't associated with another control — for example, it's a title for the whole form, or part of the form — choose the Ignore Error option. If the label applies to a nearby control, choose the Associate Label with a Control option and choose a control from the list that appears. The convenient thing about associating a label with the control to which it applies is that when you move the other control around, the label moves, too.

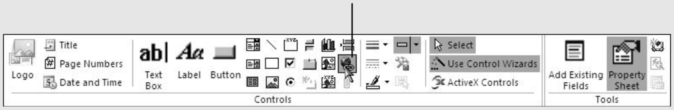
TIP

It's a link!

You can make a special kind of label that consists of a Web address (hyperlink) that you click to display a Web page. This kind of label may be nice if you want to provide helpful information about using the form on a Web site, or if you're using data access pages for data entry.

Instead of clicking the Label button, choose the Hyperlink button (a little globe picture with a set of chain links at the bottom) from the Controls group of the Design tab on the Ribbon, type the text that you want to appear on your form in the Text to Display box, type the Web address into the Address box, and click OK. (See the following figure.) You get a clickable label control that displays the text you specified. In Form view, clicking the label switches to your browser (or runs it, if it's not already running) and displays the Web page you specified.

You can turn an existing label into a hyperlink label by changing its `Hyperlink Address` property. In the Property sheet for the label control, click the Format tab and type a Web address into the Hyperlink Address box.



Hyperlink button

To edit any text you entered, click the label box once to select it; then press F2 to edit the text. Press Enter when your edits are complete, or the Esc key to cancel editing. To change the font, size, or color of the label, see the section "Formatting Your Text," later in this chapter.

Putting Text and Memo fields in text boxes

Text, Memo, Hyperlink, and calculated fields usually appear in text boxes. You can adjust the size, shape, font size, and other features of each text box. You may want to make the most important fields appear in larger type, or in boldface.

To make a text box for a Text or Memo field, drag the field name from the Field list onto the form or report where you want the text box to appear. Or choose the Text Box button on the Toolbox and draw an outline where you want the text box to appear. Access makes a text box the size you indicated, along with a label control with the name of the field.

After you have the text box in place, you can make the text large, bold, or purple (or all three!) as described in the "Formatting Your Text" section later in this chapter. The next chapter explains ways to make your text boxes smarter, starting with preset default values and validating the information that people type in.

How long should your text box be to fit the information that it may contain? Access has a nifty command that adjusts the width of a text box to match the width of the field that it contains. Select the text box and choose Format➪Size➪To Fit.

You can format the contents of Text, Memo, and Hyperlink fields a bit, mainly controlling capitalization. Book II, Chapter 1 lets you in on how to display text in upper- or lowercase, limit what you type to a certain number of characters, or add preset characters to a field (such as dashes or parentheses to phone numbers) — you find out what magic characters to type in the `Format` property of your text box. For other types of formatting, such as fonts and colors, see the section "Formatting Your Text," later in this chapter.

Displaying Number, Currency, and Date Fields

Number, Currency, and Date fields appear in text boxes, too, just like Text and Memo fields. You create text box controls to display Number, Currency, and Date fields the same way you create them for Text fields, using the Field list or Toolbox.

You can set the format of numbers in a text box to display a currency sign (such as a dollar sign), to control the number of decimal places that appear, and to display thousands separators (in the U.S. and Canada, we use commas for this). On the Format tab of the Property sheet for the text box, click in the `Format` property and then click the downward-pointing triangle at the right end of the setting. You see a big, long list of formats to choose from, starting with date formats and continuing with numeric formats. To control the number of decimal places that appear, set the `Decimal Places` property (the `Auto` setting means that Access decides how many places to display).

For dates in a text box, you can control the order of the month, day, and year; whether to omit the day or year; how many digits to show for the year; and whether to display the name or number of the month. Make your choice from the `Format` property on the Format tab of the Property sheet.

If you want to make fancier numeric or date formats, see Book II, Chapter 1. Forms and reports can include calculated numbers and dates, too. For example, an order form can display the sales tax based on the total amount of the order. See Chapter 4 of this minibook for how to get Access to do your arithmetic for you.

Moving, Renaming, Resizing, Deleting, and Copying Controls

The first step in doing all the stuff listed in the nice heading above is to select the control, so go ahead and click the control to select it. You can tell when the control is selected, because little boxes, called *handles,* appear around it, as shown in Figure 2-7. If the control has a label associated with it, handles appear around the label control, too.

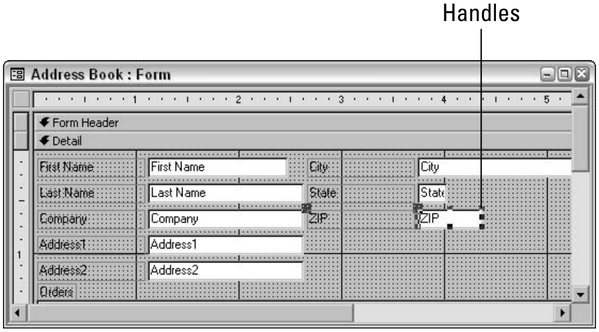

Handles

Figure 2-7: Drag the handles to resize a control.

After you tell Access which control you want to work on (by selecting the control), here are some things you can do:

- **Moving a control:** Drag the control to a new location with your mouse.
- **Renaming a control:** Change the `Name` property of the control, which appears on the Other tab of the control's Property sheet.
- **Resizing a control:** Drag one of the handles to move that edge of the control. Exactly what happens depends on the control: Some controls can't be resized (such as a radio button). For labels, text boxes, and many other controls, the control stretches or shrinks as you drag its edge around the form or report.
- **Deleting controls:** Press the Del key. (Oops! If you didn't mean to delete it, then press Ctrl+Z or choose the curved backward arrow at the top right hand corner of the page.)
- **Copying controls:** Press Ctrl+C to copy the control to the Windows Clipboard. Then press Ctrl+V to paste a copy from the Clipboard back into the Design View window. Then drag the copy where you want it to be. Cleverly, if you press Ctrl+V *again* to paste another copy of the control, Access tries to figure out where you want the new one based on where you dragged the last copy (a nice feature, we thought). After you copy and paste the control, you can modify it as you like.

TIP

You can select the label associated with a control separately from the control itself. To select only the control and not the label, click the handle in the upper-left corner of the control (the mouse pointer turns into a little hand when you point to this handle). To select only the label, click the handle in the label's upper-left corner. This method enables you to move the label closer or farther away from its control.

You can also change the type of a control. For example, if you make a text box and wish later that it were a combo box (described in the next chapter), you don't have to delete the control and start over. Instead, right-click the control and choose the Change To command from the shortcut menu that appears. Access shows a submenu listing the types of controls to which you can change this control.

Formatting Your Text

You can format the label and text box controls in lots of ways, almost as if you were using a word processor. In fact, when you select a control with text in it, you can use the tools in the Font group of the Design tab on the Ribbon to change the font characteristics. Figure 2-8 shows the Font group of the Design tab on the Ribbon.

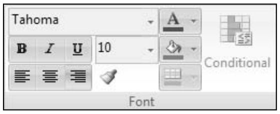


Figure 2-8: The tools of the Font group of the Design tab on the Ribbon.

Here are some of the properties of labels (and some other controls) that you may want to set:

- **Color (Capital A with a color beneath it):** Text doesn't have to be boring black on ho-hum gray. With the control selected, click the downward-pointing triangle on the right side of the Fill/Back Color button on the Font group of the Design tab on the Ribbon and choose the color you want as the background color. Click the triangle on the Font/Fore Color button and choose the text color.

  If you want more colors, you can set them using the Format tab of the Property sheet for the control. Set the `Back Color` property to the background color you want and the `Fore Color` property to the color for the text itself. These properties start as horrendous-looking 10-digit numbers, but they are easy to change. Click in the property and a Build button (it looks like an ellipsis) appears to its right. Click this button to display the Color dialog box, shown in Figure 2-9 (unfortunately, black-and-white printing really doesn't do this dialog box justice). Click a color and click OK. If you want an even fancier color that doesn't appear in this dialog box, click the More Colors button, then Standard (for predefined colors) or Custom (for more creative build-it-yourself colors) tab, and go to town.

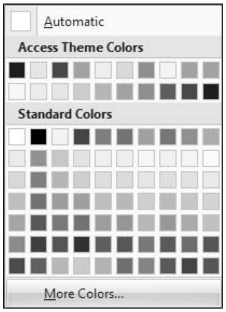


Figure 2-9: Changing the background and foreground colors.

- **Box:** You can put a box around the control by clicking the downward-pointing triangle on the Line/Border Color button of the Format tab in the Property Sheet box and choosing a color, or by setting the `Border Color` property on the Format tab of the Property sheet. To change the thickness of the box, you can set the `Border Width` property by clicking the triangle on the Line/Border Width button in the Format tab of the Property Sheet box and choosing a line width.
- **Special Effect:** You can make all selected labels and controls look sunken, raised (like a button), or shadowed. Click the downward-pointing triangle to the right of the Special Effect button in the Format tab of the Property Sheet box, and choose from the palette of options. (Or right-click the control and choose the Special Effect command from the shortcut menu.) If you wonder what a particular special effect does, hover your mouse pointer over it until a description pops up.
- **Font:** You can control the typeface of the label text by editing the Font box on the Font group of the Design tab of the Ribbon (or the `Font Name` property on the Format tab of the Property sheet). It's usually set to MS Sans Serif; don't try anything really fancy, or your text will be unreadable. (For the figures in this chapter, we used a font named Calibri.) Adjust the size of the text by typing a point size into the Font Size box on the Font group of the Design tab of the Ribbon, which also has buttons for boldface, italics, and underlining.

- **Alignment:** To left-align, right-align, or center the text within the edges of the control, click the Align Left, Center, or Align Right buttons from the Font group of the Design tab of the Ribbon, or set the `Text Align` property on the Format tab of the Property sheet. If you really want to get weird, you can even display the text sideways within the box, by setting the `Vertical` setting on the Other tab of the Property sheet to `Yes` .

Copying your formatting

After you go to the effort of prettifying one control, why reinvent the wheel to make another control to match it? You can simply copy the formatting from one control to another by using the Format Painter. The Format Painter copies all formatting — colors, fonts, font sizes, border sizes, alignment, and anything else that you can think of. Select the beautifully formatted control and click the Format Painter button from the Font group on the Design tab of the Ribbon. Your mouse-pointer now has a paintbrush attached to it, so you know the tool is active. Click the control that you want formatted like the original control.

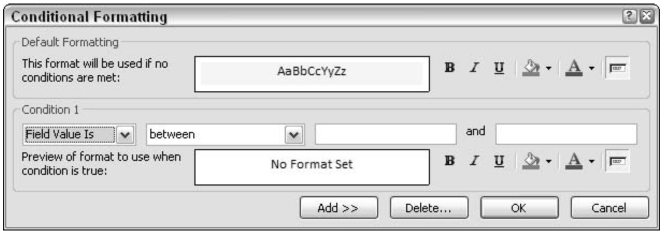
Make it red if it's bad news

Access has a cool feature called *conditional formatting* that lets you make a control look one way normally and a different way — maybe boldface and red — under special circumstances. For example, the total amount of an order for an online store ought to be a positive, unless the customer is due a refund. Wouldn't it be great if the form reaches out and grabs you if the total order amount turns out to be negative? Well, Access can't reach out of the screen, but it can make the control appear in bright red, boldface, or both.

To set up conditional formatting, follow these steps:

1. **Right-click the control in Design view and choose the Conditional Formatting option from the shortcut menu that appears. Or choose the Conditional button in the Font group on the Design tab of the Ribbon.**

   You see the Conditional Formatting dialog box, shown in Figure 2-10. The Default Formatting section of the dialog box shows you how the control looks normally. The Condition 1 section shows how it will look under circumstances that you're about to specify.



Conditional Formatting

Default Formatting

This format will be used if no conditions are met: AaBbCcYyZz

Condition 1

Field Value Is between and

Preview of format to use when condition is true: No Format Set

Figure 2-10: The Conditional Formatting dialog box.

2. **Set Condition 1 by choosing an option from the drop-down list and filling in the rest of the boxes.**

   The drop-down list displays these options:

   - **Field Value Is:** The formatting depends on the value of the field displayed in this control. You set the rest of the boxes to the right of the drop-down list to tell Access the value(s) for which you want the conditional formatting to take effect.
   - **Expression Is:** The formatting depends on a calculation that you type into the box to the right of the drop-down list.
   - **Field Has Focus:** The formatting takes effect when the control is active (when the user clicks in it or moves to it with the keyboard). This option is useful if you want to make it screamingly obvious when the user is editing this particular field.

3. **Set the format by clicking the formatting buttons in the Condition 1 box.**

   If you want more than one condition, you can click the Add button to add a Condition 2 section to the dialog box and create a second set of conditions and formatting for the control.

4. **Click OK.**

Creating Check Boxes for Yes/No Fields

When you drag a Yes/No field from the Field list to the Design View window of your form or report, Access assumes that you want to display the field as a check box — a `Yes` value appears as a checked box, and a `No` value appears as a blank box. You can't change the size of a check box — dragging its edges expands the box around it, but the check box just sits there.

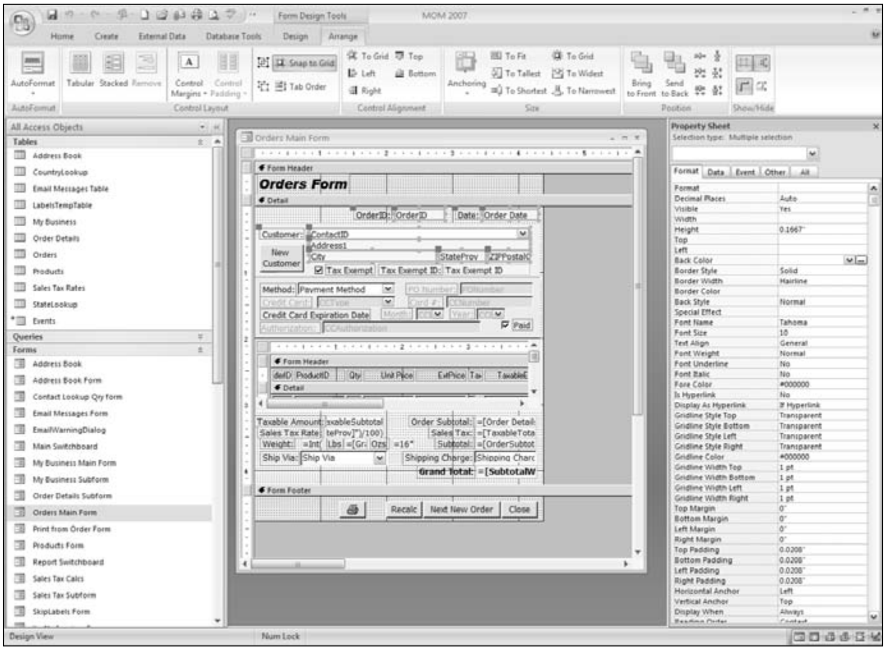
Another way to create a check box is by clicking the Check Box button on the Controls group of the Design tab of the Ribbon and then clicking in the Design View window where you want a check box to appear. If you use this method, you need to set the check box's `Control Source` property on the Data tab of its Property sheet to be the name of the field.

Alternatively, you can display different information depending on whether the Yes/No field is `Yes` or `No`. For example, for tax-exempt companies, your order form can display a Tax Exempt ID box that only appears if the `Tax Exempt` field is set to the `Yes` value. See Chapter 3 of this minibook for how to display information that depends on other fields in this way.

Neatening Up Your Controls

You can spend hours fooling with the formatting of your forms and reports, moving controls around, getting all the labels to match, and choosing fonts and colors. (We certainly have!) One important aspect of design is neatness — forms are easier to use and reports are easier to read if they look neat and organized. People can find the information they are looking for — or the entries that they need to make — more easily if everything lines up nicely.

Luckily, Access has features that make it easy to line up your controls, so you don't have to squint at the screen and drag each control left or right by microscopic amounts. Instead, you can select a bunch of controls and deal with them all at the same time. To select more than one control, click one control and Shift-click the rest of the controls. Or drag around the group of controls with your mouse pointer: Access selects all the controls that are within that area (even if only part of the control is in the area). In Figure 2-11, the City, State/Province, and ZIP/Postal Code text boxes (and their labels) are selected. Notice that on the Form Design Tools portion of the Ribbon, we now have the Arrange tab selected.



Property Sheet
Selection type: Multiple selection

Format | Data | Event | Other | All

Format	
Decimal Places	Auto
Visible	Yes
Width	
Height	0.1667"
Top	
Left	
Back Color	
Border Style	Solid
Border Width	Hairline
Border Color	
Back Style	Normal
Special Effect	
Font Name	Tahoma
Font Size	10
Text Align	General
Font Weight	Normal
Font Underline	No
Font Italic	No
Fore Color	#000000
Is Hyperlink	No
Display As Hyperlink	If Hyperlink
Gridline Style Top	Transparent
Gridline Style Bottom	Transparent
Gridline Style Left	Transparent
Gridline Style Right	Transparent
Gridline Color	#000000
Gridline Width Top	1 pt
Gridline Width Bottom	1 pt
Gridline Width Left	1 pt
Gridline Width Right	1 pt
Top Margin	0"
Bottom Margin	0"
Left Margin	0"
Right Margin	0"
Top Padding	0.0208"
Bottom Padding	0.0208"
Left Padding	0.0208"
Right Padding	0.0208"
Horizontal Anchor	Left
Vertical Anchor	Top
Display When	Always
Reading Order	Context

Figure 2-11: Selecting more than one control at a time.

After you select a bunch of controls, you can do the following things with them:

- **Moving groups of controls:** If you want to move a bunch of controls together, select them all and then drag them to a new location. Access leaves the space between the controls unchanged.
- **Making controls the same size:** You can tell Access to make all the selected controls the same height or width. To make the widths all the same, choose Arrange➪Size➪To Widest from the Ribbon to make all the controls as wide as the widest control you selected. Or choose Arrange➪Size➪To Narrowest to match the narrowest (left to right). To make the heights of the controls the same, choose Arrange➪Size➪To Tallest or Arrange➪Size➪To Shortest. For example, in Figure 2-12, choosing the To Widest option makes all the text boxes as wide as the ContactID box.

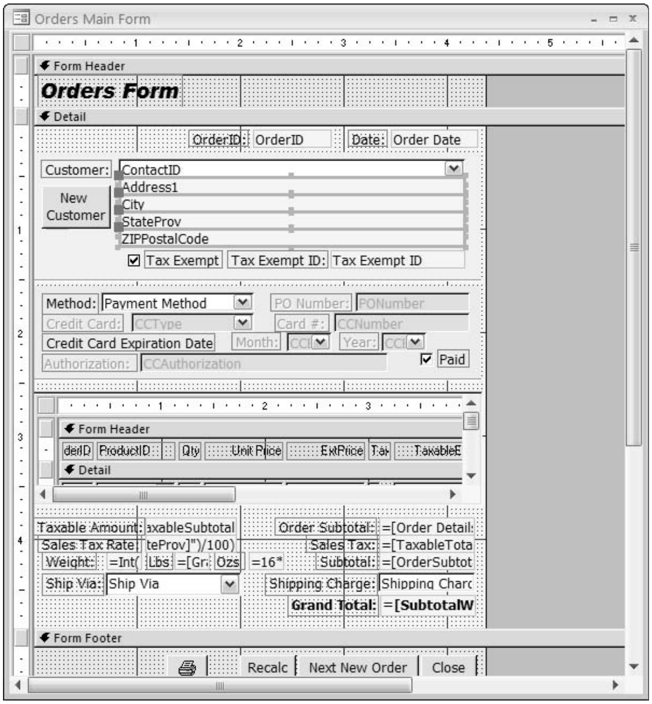


Figure 2-12: Making all of the fields fit the widest field.

- **Lining up your controls:** You can adjust the edges of your controls to line up with the grid lines that appear in Design view. With the controls selected, choose Arrange➪Control Layout➪Snap to Grid. Access moves the edge of each control to the nearest gridline.

You can also get Access to move all the selected controls so they are left-aligned (that is, the left edges line up) or right-aligned. Choose Arrange➪Control Alignment➪Left, or Arrange➪Control Alignment➪Right. We like to see labels right-aligned next to text boxes that are left-aligned, but it's a matter of taste!

- **Spacing controls evenly:** Controls look better if there is a consistent amount of vertical space between one control and the next — for example, one gridline or two gridlines. Rather than moving controls up and down by hand, Access can do this task for you. Select the controls you want to space and choose Arrange➪Position➪Equal Vertical. You can also move all the controls together or apart by choosing Arrange➪Position➪Decrease Vertical or Arrange➪Position➪Increase Vertical.
- **Setting the properties of all the controls:** After you select a group of controls, the Property sheet changes to the Multiple Selections sheet. If you change the settings of any properties, Access makes the change to all the controls. Similarly, you can make changes on the Formatting toolbar to format all the controls at the same time.
- **Letting Access set the format:** Access has some preset formats that don't look half-bad. To change the formats of all the selected controls to one of the Access AutoFormats, choose Arrange➪AutoFormat➪AutoFormat from the Ribbon, select an AutoFormat (you have choices like Industrial and International), and click OK. If you don't like the results, choose the AutoFormat command again and choose the Standard AutoFormat, which looks like the Access default controls.

Adding Lines, Boxes, and Backgrounds

Some forms and reports have several sections, and they are easier to use if you separate the sections by lines or boxes. For example, an order form may have one section with information about the customer, another section showing what items were ordered, and a third section with payment information.

To draw a line, click the Line button on the Controls group of the Design tab of the Ribbon, and draw the line in the Design View window using your mouse.

Drawing a box works the same way. Click the Rectangle button on the Controls group of the Design tab of the Ribbon and draw the box, starting at one corner and dragging the mouse to the opposite corner.

You can set the colors and thickness of a line or box by using the Line/Border Color and Line/Border Width buttons on the Format tab of the Property Sheet box.

You can specify a picture to display in the background of the form or report. Picture backgrounds seem like a demented idea to us — we hate forms and reports with clouds or sunsets in the background, because they make forms look busier and more confusing. But if you want to jazz up your form or report, set the `Picture` property, which is on the Format tab of the Property sheet, to the file name of a picture — click the Build button (it shows an ellipsis) to its right to navigate to the file.

Controlling Cursor Movement in Your Form

You made a bunch of controls and formatted them nicely, and your form looks pretty spiffy. But here's a question you may not have thought about: When you (or other people) are using the form to enter or edit data, how does the cursor move from control to control? That is, when you press Enter or Tab to leave a text box or other control that allows you to edit information, which control does your cursor move to? Access calls this the *tab order* of the form.

Access stores the tab order for each form, which is a list of the editable controls on the form (that is, controls that allow data entry or editing in Form view). When you press Enter or Tab in Form view, your cursor moves from control to control in the same order as the Access list. Here's the problem: When you create a new control, Access adds it to the bottom of the list, even if the control is at the top of the form. As a result, your cursor skips around when you try to use the form.

The solution is to adjust the tab order of the form. To see the tab order list, follow these steps:

1. **With the form in Design view, from the Ribbon, choose Arrange➪Control Layout➪Tab Order.**

   You see the aptly named Tab Order dialog box.

2. **Change the order of the controls by dragging them up or down the list with your mouse.**

   Alternatively, click the Auto Order button to tell Access to put the controls into order based on their positions — from top to bottom and left to right — on the form.

   Access reorders the controls, and you can look at the new order to see if Access got it right.

3. **Click OK when the controls are in the right order.**

TIP

You probably already guessed this, but this whole tab-order discussion doesn't apply to reports.

Chapter 3: Creating Smarter Forms

In This Chapter

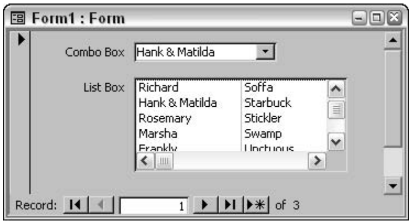
- **Making drop-down menus (combo boxes) and lists of values (list boxes) you can choose from**
- **Displaying Yes/No fields as option or toggle buttons**
- **Making groups of radio buttons**
- **Making a Find box so you can search for records**
- **Adding command buttons that display forms, print reports, and other cool commands**
- **Adding headers and footers to your forms**
- **Making forms with tabs**
- **Validating what people type**
- **Creating a switchboard for your database**

In Chapters 1 and 2 of this minibook, we explain how to make forms (and reports) and add labels, text boxes, check boxes, lines, and rectangles to them. You can go a long way with just those controls, but you'll miss a lot of the power of Access. If your database includes related tables, combo boxes and list boxes enable you (or your users) to choose values from lists instead of typing values in. If a field contains a small number of possible values, you may want to present them as radio buttons. And best of all, forms display records from more than one table through subforms. This chapter explains all this — and more.

This chapter doesn't apply to reports. Because you can't use reports for entering and editing data, the interactive features discussed in this chapter just don't work for reports (at least, not unless you have much fancier paper than we do!).

Creating and Configuring Combo and List Boxes

Combo boxes and *list boxes* are two controls that work like the drop-down lists that you see in Windows programs. Each box displays a list of values from which you can choose one value. The difference between the controls is how many values they display. A combo box shows only the currently selected value; you click the downward-pointing triangle on its right side to get the list to drop down so you can select a different value. A list box shows all the possible values (or as many as fit in the control, with a scroll bar to see the rest of the values), of which one is selected. Figure 3-1 shows a combo box and a list box.



Combo Box: Hank & Matilda

List Box:

Richard	Soffa
Hank & Matilda	Starbuck
Rosemary	Stickler
Marsha	Swamp
Frankly	Unctuous

Record: 1 of 3

Figure 3-1: You can use a combo box or list box to enable people to choose from a list of values.

List boxes take up more room on forms than combo boxes, so they are used far less often. On the other hand, they allow you to see more values at the same time. We explain how to create both list and combo boxes (the process is almost the same), but our examples concentrate on combo boxes.

Before you create a combo or list box, consider the following questions:

- **Where will the values come from?** The combo or list box displays a list of values. Are the values stored in a table, or will you type them in when creating the control? If you use this list of values in any other control on another form anywhere in your entire database, put the values in a table — just a plain old table, with one field for the value, and additional fields if you store other facts about each value. Make sure that the table has a primary key to uniquely identify each record. For example, if your bookstore has three types of products, these product codes need to be in a table, because you're sure to use them in lots of different forms and reports. Don't type them in as the values of a combo or list box.
- **If the values are stored in a table, which field (or fields) of the table do you want to appear in the control?** You can choose one or more fields, but don't choose too many or the list gets enormous. For example, a combo or list box for a `StateAndProvince` field can display the two-letter state or province abbreviation, the full state or province name, or both.
- **When the user of the form makes a choice from this control, what happens to the selected information?** Most forms are used for editing the records in a table or query (the record source for the form). If the purpose of the combo box or list box is to help the user enter a value in a field, then make a note of the field name. On the other hand, you may want to use the combo or list box for another purpose, such as allowing the user to find a record (as described in the section, "Making a Find box," later in this chapter).

For example, for an order entry database, you may want a combo box that lists the states and provinces in the United States and Canada. You have the two-letter abbreviations and full names stored in a table called StateAndProvince. You can have your combo box or list box display only the state or province name on the form, but have the control store only the abbreviation for the selected state or province in the order-entry table that you're editing.

Making combo boxes the really easy way

If you set up a field as a lookup field — a field that must match the primary key field in a table of codes — Access creates a combo box when you drag it from the Field list to the Design View window of the form. Easy enough! By configuring the field as a lookup field, you've already told Access what table and field to use for the list of values.

To find out how to make a lookup field, see Book II, Chapter 5.

Running the Combo or List Box Wizard

To make a combo box or list box when you didn't designate the field as a lookup field, a wizard steps you through the process. Before you start, determine where the list of values comes from, as described in the previous section. The Combo Box and List Box Wizards ask the same questions that we pose, so you'd better have the answers. We describe the Combo Box Wizard, because combo boxes outnumber list boxes 10 zillion to one in actual usage, but the List Box Wizard is similar.

To create a combo box with the Combo Box Wizard, follow these steps:

1. **Open the form in Design view.**

   Select the form in the Forms section of the Database window and click the Design button.

   If Design view is new to you, jump back to Chapter 1 of this minibook for an overview of Design view.

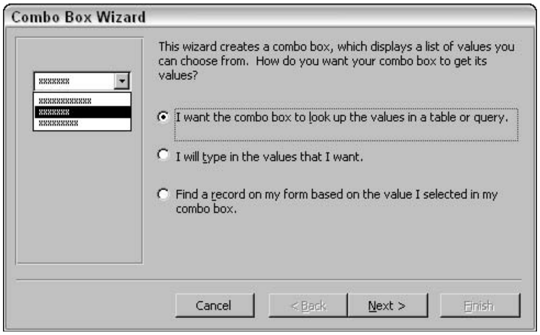
2. **Under the Form Design Tools Ribbon, click Design⇨Controls and click the Combo Box button.**

3. **Click where you'd like the upper-left corner of the combo box to appear.**

   Don't worry if the combo box isn't in exactly the right spot — you can always move the edges later. Access displays the Combo Box Wizard shown in Figure 3-2.

4. **Choose where the list of values comes from, and click Next.**

   If the list comes from an existing table or query, choose the first option and go to Step 5. If the list of options doesn't exist in a table, choose the second option and go to Step 9. The third option is for creating a combo box that lets you jump to a specific record in your table (see the “Making a Find box” section later in this chapter).


Combo Box Wizard

This wizard creates a combo box, which displays a list of values you can choose from. How do you want your combo box to get its values?

● I want the combo box to look up the values in a table or query.

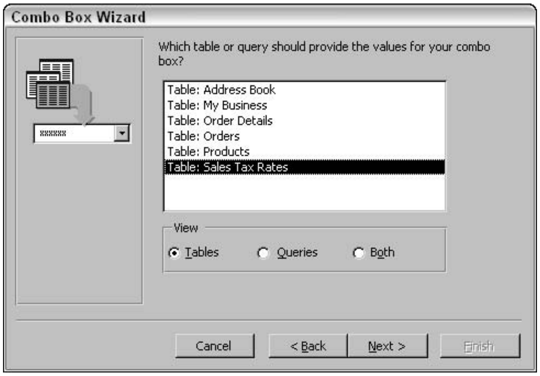
○ I will type in the values that I want.

○ Find a record on my form based on the value I selected in my combo box.

Figure 3-2: The Combo Box Wizard steps you through creating a combo box (drop-down list) on your form.

5. **If the list of values is already stored in your database, choose the table or query (as shown in Figure 3-3) and click Next.**

   The wizard displays all the tables, all the queries, or both, so you can choose the table or query that you want. If the table doesn’t have a primary key field, you can’t choose it.


Combo Box Wizard

Which table or query should provide the values for your combo box?

Table: Address Book
Table: My Business
Table: Order Details
Table: Orders
Table: Products
Table: Sales Tax Rates

View
● Tables ○ Queries ○ Both

Figure 3-3: Usually, your combo box displays a list from a table or query in a database, so you can use the same list in other combo boxes or lookups.

6. **When the wizard shows you a list of the fields in the table or query, choose the fields to display in the combo box, and click Next.**

   You can choose more than one field if you want more than one to appear in the combo box.

7. **Choose the order in which you want the records to appear in the combo box, and click Next.**

   The wizard allows you to choose Ascending or Descending order for up to four fields. Be sure that the field on which you're sorting also appears in the combo box, or the order can be confusing. For example, if you sort states and provinces by their two-letter codes, the names don't appear in order, which looks weird if the codes don't also appear.

8. **Adjust the widths of the columns by dragging the column divider left or right, and then click Next. Skip to Step 11 unless you're typing in values instead of using a table.**

   If you want the primary key field to appear in the combo box (for example, the two-letter code in a list of states), uncheck the Hide Key Column check box.

9. **If you choose to type in the list of values, type them into the datasheet, one per row, and click Next.**

   The wizard displays a datasheet into which you can type the list. When typing in a list of values, you can create more than one column (for example, a code and its meaning), of which one will be stored in the record source of the form.

10. **Choose the field that identifies each row of the combo box, and click Next.**

    The wizard asks which field uniquely identifies each row in the combo box — the equivalent of the primary key field in a stored table. (Aren't you beginning to wish you'd just stored the list in the table? Hint, hint!)

11. **Choose whether to remember the value for later use or store it in a field, as shown in Figure 3-4. Click Next.**

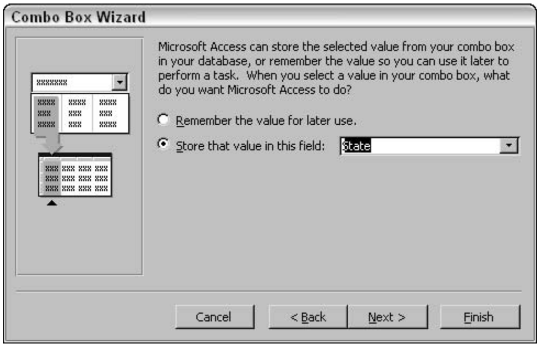
    The wizard asks what you want to do with the value of the field when the form user chooses from the combo box: Remember the value for later use (for example, refer to it in a query parameter, macro, or VBA module); or store it in a field of the table or query that is the record source for the form. Most of the time, you want to store the value in a field; choose the field name from the list.

12. **Type a label for the combo box and click Finish.**

    The wizard creates your combo box.

13. **Adjust the edges of the control to resize the combo box. Drag its label to the right place.**

    We never get the size and position of a combo or list box right the first time, and Access never puts its label in the right place. Good thing Access gives us a chance to touch things up a bit!


Combo Box Wizard

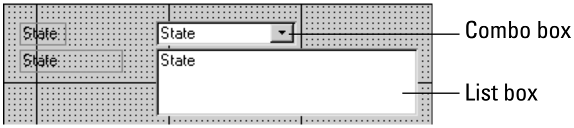
Microsoft Access can store the selected value from your combo box in your database, or remember the value so you can use it later to perform a task. When you select a value in your combo box, what do you want Microsoft Access to do?

○ Remember the value for later use.

● Store that value in this field: State

Figure 3-4: If you're using the combo box to choose values for a field displayed on the form, choose to store the value in the field.

When the wizard finishes, you end up with a combo or list box that looks like Figure 3-5, which shows one of each in Design view.



Combo box

List box

Figure 3-5: A combo box or a list box provides values from which the user can choose, but combo boxes take up less space.

The next section describes the properties you may want to change if you don't like the way your combo or list box turns out.

Changing the properties of a combo or list box

Property Sheet

You can change the way a combo or list box works by editing its properties — you're never stuck with what a wizard creates. You can display its properties and change them on the Property sheet (click the Property Sheet button on the Tools group of the Design tab of the Ribbon to display the Property sheet). The properties you're most likely to change are shown in the following table.

Property	*Description*
`Control Source`	Field in the record source in which Access stores the value that you choose from the combo or list box
`Row Source Type`	Where the items on the list come from: Table/Query, Value List, or Field List (that last option displays a list of the fields in a table or query)
`Row Source`	If you choose the Table/Query or Field List options for the `Row Source Type` property, enter the name of a table or query (or a SQL statement). If you choose the `Value List` setting, type a list of values separated by semicolons (;).
`Column Count`	Number of columns to display in the combo or list box
`Column Heads`	Whether or not to display headings for the columns of values
`Column Widths`	Widths of the column(s). If you've got more than one column, separate the widths with semicolons.
`Bound Column`	Column number in the combo or list box of the column that gets stored in the control source
`List Rows`	Number of rows that appear in the drop-down list of a combo box. (Not used for list boxes, because the size of the list box control on the form determines how many rows appear.)
`Limit to List`	Whether entries in the combo box are limited to values on the drop-down menu. Choose the `No` setting if you want to be able to type other values into the control. (Not used for list boxes, which are always limited to the values listed.)

Cool Looks for Yes/No Fields

Chapter 1 of this minibook describes how to create a check box for a Yes/No field, which looks pretty spiffy. But you have other options for Yes/No fields: option buttons (little round radio buttons) and toggle buttons (rectangular buttons that appear pressed in when selected). You can display a Yes/No field in a text box, too, but the `Yes` value appears as `-1` and the `No` value appears as `0`, which may not be what you want. Figure 3-6 shows a check box, option button, and toggle button.

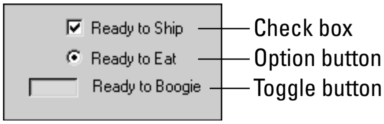


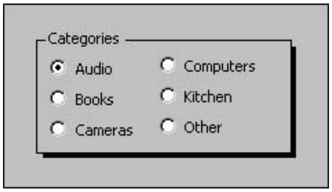
Figure 3-6: Display a Yes/No field as a check box, option button, or toggle button.

One of the easiest ways to make a toggle or option button for a Yes/No field is to create a check box for it, and then change it into a toggle or option button. Choose the Check Box option from the Controls group of the Design tab on the Ribbon, click on the desired location on your form, and drop it where you want the control. Access makes a check box for the field. Right-click the field and choose Change To➪Option Button, or Change To➪Toggle Button from the shortcut menu that appears. Adjust the size and position of the control and its label, and you're done!

Creating Option Groups

If a field is set to one of a small number of numeric, integer values — such as 1 to 10 — you can display the values in a box, with an option button by each value. When editing records using the form, you click the option for the value to which you want to set the field. Only one option can be selected at a time; clicking one option deselects the other options.

Making a group of option buttons for a field requires creating an *option group* — a rectangle within which you put an option button for each possible value of the field. Figure 3-7 shows option buttons in an option group. Luckily, Access comes with the Option Group Wizard that creates the option group and all the option buttons.



Categories

● Audio
○ Books
○ Cameras
○ Computers
○ Kitchen
○ Other

Figure 3-7: An option group contains an option button for each value that the field can take.

Before you run the Option Group Wizard, make a note of the values that the field takes. After the wizard is running, you can't open another table to see the values to which the field is limited. You may want to keep the table that lists the possible values open and visible in the corner of the Access window while you run the wizard.

Note that option groups work only with integer, numeric values. You can show any label you want next to each option button, but the value that Access stores for the option group has to be a whole number. In the option group shown in Figure 3-7, the actual category codes may be the numbers from 1 to 6.

An option group can contain option (radio) buttons, check boxes, or toggle buttons. However, most people expect check boxes and toggle buttons to stand by themselves, not to be in a group of mutually exclusive options. We recommend sticking with option buttons in option groups.

To make an option group and option buttons for a field, display your form in Design view and follow these steps:

1. **Click the Group icon in the Control Layout group of the Arrange tab on the Ribbon. Drag the mouse from one corner to the opposite corner of the area you want the option group to occupy.**

   Access draws a box for the option group and then runs the Option Group Wizard. (It may not be installed on your computer; if it isn't, Access asks whether you want to install it now. Get your Microsoft Office CD and follow the prompts.)

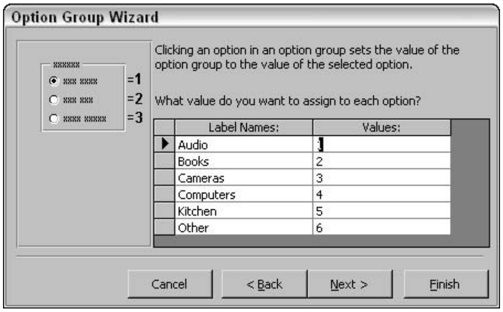
2. **The wizard prompts you for a list of the labels for the individual option buttons. Type them in, one per line, and click Next.**

   Don't press Enter after typing in a value; the wizard thinks you're clicking Next. Instead, press Tab or the down arrow to move to the next row in the datasheet. (If you accidentally press Enter, click the Back button to get back to this screen.)

3. **In the next window, choose whether one of the choices that you just typed should be selected by default when you create a new record in the table. Choose the default value for the field, or choose the No I Don't Want a Default option. Click Next.**

4. **You see a list of the labels that you typed in Step 2. In the right-hand column, type the number to store for each value, as shown in Figure 3-8. Click Next.**

   Each label must have a different value, and all the values have to be whole numbers.



Option Group Wizard

Clicking an option in an option group sets the value of the option group to the value of the selected option.

What value do you want to assign to each option?

Label Names:	Values:
Audio	1
Books	2
Cameras	3
Computers	4
Kitchen	5
Other	6

Figure 3-8: When you create an option group, you specify a label and a value for each option button in the group.

5. **Choose to save the value for later use or to store it in a field (and specify the field). Click Next.**

   If you're creating a form for editing a table, choose the Store the Value in This Field option. If the form is unbound (not connected to a record source) and the options are for use as an input to a query, macro, or VBA module, choose the Save the Value for Later Use option. (See Book VI, Chapter 1 for how to run macros from a form, possibly using inputs from the form.)

6. **Choose whether the options appear as option buttons, check boxes, or toggle buttons, and choose the style for the option group box. Click Next.**

   We strongly recommend choosing option buttons (the default), because most people expect option buttons to be in groups of mutually exclusive options and check boxes and toggle buttons to work independently of each other.

7. **Type a caption (label) for the option group and click Finish.**

   The caption appears at the top of the option group. When you click Finish, the wizard creates your option group and an option button (or check box or toggle button, if you callously disregarded our advice) for each value you specified.

After the wizard finishes, you can resize the option group box and move the option buttons around inside it.

If you change the list of possible values later, the option buttons on your form don't change automatically. For example, if a set of option buttons shows all the categories of products that your store sells and you add a new product category, you need to remember to edit the form and add a new option button to the option group. For this reason, combo boxes are used more frequently to provide lists of possible values, because when you update a table from which the combo box gets its list of values, the combo box updates automatically the next time you open the form.

Creating Command Buttons

Dialog boxes contain command buttons, such as Save and Cancel, and your forms can, too. When you create a command button, you tell Access what program the button should run. Programs can take two forms: macros (described in Book VI) and VBA modules (described in Book VIII). Luckily, wizards can do a lot of the work for you. You don't need to know how to create either macros or VBA modules to make nifty command buttons on your forms.

This section covers how to run the Command Button Wizard to make command buttons that do useful stuff. The wizard creates a VBA module for the form to contain the programs for the buttons on the form. The wizard makes buttons with actions that it divides into these categories:

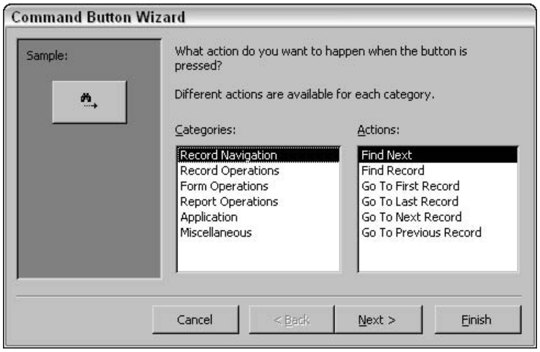
- **Record Navigation:** These commands are for moving from record to record. Most of them duplicate the navigation controls that appear at the bottom of most forms (Go to First Record, Go to Previous Record, Go to Next Record, and Go to Last Record), but you can also make a Find Record button that displays the Find and Replace dialog box or a Find Next button to repeat the previous search. If you want to make a box right on the form into which you can type a value and a Find button that searches for that value, see the section, "Making a Find box," later in this chapter.
- **Record Operations:** This category includes buttons for adding, deleting, duplicating, printing, saving, and undoing the edits to a record (the current record, in most cases). The Duplicate Record button adds a new record that is a duplicate of the current record. The Print Record button prints the form with the data for the current record.
- **Form Operations:** These commands apply or edit filters (which are described in Book II, Chapter 3), close this form, open another form, or print another form. (**Warning:** If you print another form, you get *all* the records in that form, so you may want to come up with another method.) You can also make a button that reloads the data on the form, in case it has changed since you loaded the form.
- **Report Operations:** You can make command buttons to preview, print, mail, or save a report to a file. However, there's no way to restrict the report to a specific record without editing the code behind the form.
- **Application:** These commands run other Microsoft Office programs (like Word or Excel) or other applications.
- **Miscellaneous:** This last group of commands includes commands to dial a phone number (assuming that your computer is connected to a dial-up modem and a phone), print a table in Datasheet view, run a macro, or run a query and display the resulting datasheet.

Making a Close Button

Who needs a Close button when forms already have a big X button in the upper-right corner? Some people like to have a Close button anyway, and it's easy enough to make. Here's how:

1. **With your form open in Design view, click the Command Button button from the Controls group on the Design tab of the Ribbon.**
2. **Click in the form where you want the button to appear.**

   Don't worry about the exact location; you can always move it later. Access starts the Command Button Wizard shown in Figure 3-9.



What action do you want to happen when the button is pressed?

Different actions are available for each category.

Categories: Record Navigation

Actions: Find Next

Figure 3-9: The Command Button Wizard includes lots of preprogrammed commands for your button to run.

3. **Choose the Form Operations category and the Close Form action. Click Next.**
4. **Choose whether you'd like to have text or a picture on the button, and click Next.**

   If you choose the Text option, you can edit the text in the box. If you choose the Picture option, you can choose from the list of suggested icons, or click the Browse button to look at the full set of icons Access provides. You can use any bitmap (`.bmp`) file as an icon.
5. **Type a name for your new control and click Finish.**

   The wizard creates a command button control where you originally clicked the form. Now you can drag the edges of the button to resize it, or drag the whole button to another location.

After creating a command button using the wizard, you edit its properties, as described in the "Customizing your command button" section, later in this chapter.

Making a button to display a related form

You can make a command button to display another form. You can display any old form in the database, but this kind of command button is most powerful when you use it to display a form that shows the records of a table that relates to the records in your original form. For example, you may be working on an Order form that displays information about each order of your online store. You can add a command button that opens the Address Book form showing the record for the customer that placed the current order, including the customer's address, phone number, and other information.

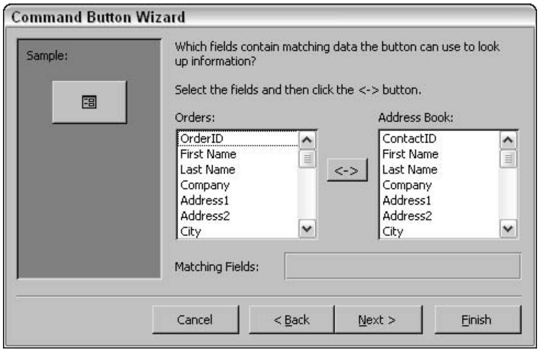
Here's how to add a button to display another form:

1. **With the form open in Design view, click the Command Button button on the Controls group of the Design tab of the Ribbon.**
2. **Click in the form where you want the button to appear.**

   The Command Button Wizard fires up to create your button.
3. **Choose the Form Operations category and the Open Form action. Click Next.**
4. **Choose the form name you want the button to open from the list, and click Next.**
5. **In the next window, choose whether to display the form with all records available, or display a specific record on the form. Choose the Open the Form and Find Specific Data to Display option, and click Next.**

   This option tells the wizard that you want to display a specific record — in the next step, you tell the wizard which record you want to see.
6. **Choose the fields from the two forms that match. Click Next.**

   You see two lists of fields, as shown in Figure 3-10: The left-hand list shows the field in the record source of the current form, and the right-hand list shows the fields in the record source of the form you want the button to open.



Command Button Wizard

Which fields contain matching data the button can use to look up information?

Select the fields and then click the <-> button.

Figure 3-10: You can display a form with the record that matches the current record of the current form.

7. **Choose the text or picture to appear on the form, click Next, type a name for the control, and click Finish.**

   The wizard makes the command button. Switch to Form view by clicking the View button on the toolbar. Try out your new button!

Making a button to print the current record

The Command Button Wizard offers a number of print actions, but most of them don't work the way you might wish. The Print a Form action prints a form once for every single record in the form, so you need to come up with a way to restrict the records to the one(s) you want. If you want to print the current record in the current form, run the Command Button Wizard and choose the Record Operations category and the Print Record action.

If you want to print a report for just the record in the current form, you need to do some extra work. Specifically, you need to make a macro that the button runs, and you need to set up the macro to print the report with the records limited to those records that match the record currently displayed on the form.

Luckily, this macro is short and easy to make — see Book VI, Chapter 1 for specific directions.

Making other cool buttons

You can run the Command Button Wizard to make lots of other useful buttons. Command buttons do some of our favorite things. The following list shows how the wizard creates them:

- ✦ **Add a new record that's a duplicate of the current record:** Choose the Record Operations category and the Duplicate Record action.
- ✦ **Save the current record:** Choose the Record Operations category and the Save Record action.
- ✦ **Display the results of a query in Datasheet view:** Choose the Miscellaneous category and the Run Query action.
- ✦ **Run a macro:** Choose the Miscellaneous category and the Run Macro action. (Book VI describes how to make macros that do all kinds of things.)

Customizing your command button

You can edit the properties of a command button after you create it. To do so, display the button's Property sheet, double-click the command button in Design view, or click the Property Sheet button from the Tools group on the Design tab of the Ribbon and select the command button.

Some of the most useful properties and what they do are in the following table.

Property	Description
`Caption`	Text that appears on the button unless it displays a picture. (If the `Picture` property specifies a picture, the button shows the picture, not the caption.)
`Picture`	Picture (icon) that appears on the button. The term (bitmap) indicates that you selected a picture. Click the Build button to the right of the property to select a different picture. If the picture is blank, Access displays the Caption text.
`On Click`	What program (macro or VBA module) Access runs when you click the button.

You can tell Access to run programs when you click, double-click, move into, or move away from the button (and at other times, too). (See Book VI, Chapter 1 for instructions.)

Making a Find box

When you're using a form, press Ctrl+F to display the Find and Replace dialog box that you can use to jump directly to a record that matches the criteria you specify. But wouldn't it be nice to have a combo box right on the form with the Find button next to it, so you can locate a record without bringing up a separate dialog box? Access makes this surprisingly easy.

For example, on an Address Book form, you could create a combo box that would list all the customers in your Address Book. When you choose a customer, the macro takes you right to that customer's record.

Follow these steps to create a Find box:

1. **With your form open in Design view, click the Combo Box button on the Controls group of the Design tab of the Ribbon.**
2. **Click in your form where you want the Find box to appear.**

   The Combo Box Wizard runs, as described in the "Running the Combo or List Box Wizard" section earlier in this chapter.
3. **Choose the Find a Record on My Form Based on the Value I Selected in My Combo Box option, and click Next.**

   Access displays a list of the fields in the record source of the form.
4. **Choose the table or query that contains the list of values from which the user can choose when finding a record. Click Next.**

   If you choose a field that is unique for each record (for example, the `OrderID` field for a form that displays orders), the combo box provides you with a list of the values for the field, and choosing a value takes you right to the order. If you choose a field that's not unique, the combo box displays a list with duplicate values and finds records unpredictably.

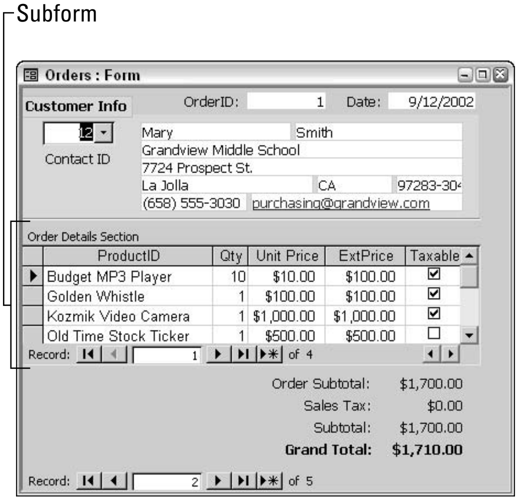
5. **Adjust the width of the column to set the width of the drop-down list by dragging the column divider. Then click Next.**

6. **Type a name for the combo box control and click Finish.**

   The wizard creates the combo box. Switch to Form view by clicking the View button on the toolbar, and then test it out.

Adding and Linking Subforms

You use subforms to display related data from different tables. For example, for an online store, if you have a form that shows information about one order from your Orders table, it would be nice if you could also see a list of the items that were included in the order, which may be stored in the related Order Details table. Figure 3-11 shows an example. The main form displays records from the "one" side of a one-to-many relationship and the subform displays records from the "many" side. As a result, the subform displays many records that relate to the "one" record on the main form.



Subform

Orders : Form

Customer Info

OrderID: 1 Date: 9/12/2002

Contact ID: 12

Mary	Smith
Grandview Middle School	
7724 Prospect St.	
La Jolla	CA 97283-304
(658) 555-3030	purchasing@grandview.com

Order Details Section

ProductID	Qty	Unit Price	ExtPrice	Taxable
Budget MP3 Player	10	$10.00	$100.00	☑
Golden Whistle	1	$100.00	$100.00	☑
Kozmik Video Camera	1	$1,000.00	$1,000.00	☑
Old Time Stock Ticker	1	$500.00	$500.00	☐

Record: 1 of 4

Order Subtotal:	$1,700.00
Sales Tax:	$0.00
Subtotal:	$1,700.00
Grand Total:	**$1,710.00**

Record: 2 of 5

Figure 3-11: A subform shows the list of matching records from a related table.

Before you create a subform, make sure that the tables displayed by the form and proposed subform have a one-to-many relationship. Book I, Chapter 4 describes one-to-many relationships, master and detail records, and primary and foreign keys. Book II, Chapter 6 shows you how to tell Access about the relationships between tables by using the Relationships window.

A subform can have its own form layout and navigation buttons for moving around the records within the subform. One form can have more than one subform, if there's more than one table with a one-to-many relationship to the table shown in the main form.

Each subform is stored as a separate form in Access — you see the subform's name in the Database window. To display it as part of another form, you create a *subform control* on the main form, showing Access how and where you want the subform to appear on the main form.

If you want the main form to contain totals or counts of the records in the subform, see Chapter 4 of this minibook. For example, if a subform of an Orders form lists the items on the order, displaying the total cost of the items ordered on the Orders form is nice.

Creating a subform

The easiest way to create a form is by using a wizard (surprise, surprise!). You can always edit and improve the subform later. (If you're creating a report, see the section on subreports in Book V, Chapter 1.)

To add a subform to a form, follow these steps:

1. **Display the main form in Design view.**
2. **Display the Design tab of the Form Design Tools Ribbon.**
3. **Click the Subform/Subreport button from the Controls group of the Design tab of the Ribbon to tell Access that you want to add a subform to the form.**
4. **On the form, drag the mouse to create a box in which the subform will appear.**

   Access runs the SubForm Wizard to lead you through the process of creating the subform. (If the wizard isn't installed on your system, Access offers to install it; get out your Microsoft Office CD and follow the instructions on-screen.)
5. **Unless you already have a form that works as a subform, choose the Use Existing Tables and Queries option. If you already created a form, choose the Use an Existing Form option. Click Next.**

   If you choose the Use Existing Tables and Queries option, then the wizard needs to know the name of the related table, and which fields in that table you want to display. You can choose to display records from a query, if the query contains a unique field that can act as the primary field in a one-to-many relationship with the records on the main form.

   If you choose the Use an Existing Form option, skip to Step 7.

6. **In the Tables/Queries box, choose the table or query from which you want to display records. Then choose the fields you want to display by selecting fields and clicking the > button. Click Next when you're finished.**

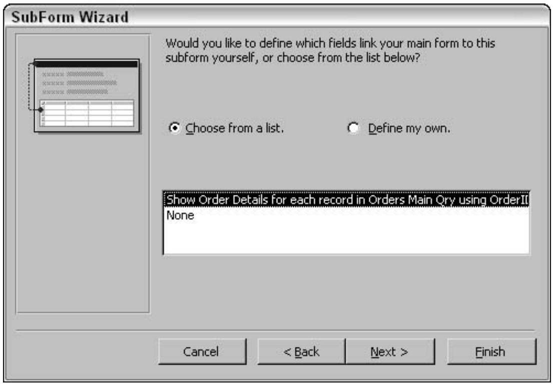
   Alternatively, you can double-click a field name to move it from one list to the other. If you want to display all the fields, click the >> button. As you select fields, they move from the Available Fields list to the Selected Fields list. Don't choose too many fields — you have to fit them all into the subform!

   Don't choose to include the foreign key, which relates to the record in the main form. For example, if you're adding an order detail subform to an orders form, the main form displays one order at a time, including its order number. The subform displays all the order detail records that have the same order number. If you include the order number on the subform, you just see the same order number over and over, once for each record in the subform. What a waste of screen space!

7. **Choose a relationship from the list, or select the Define My Own option and choose the matching fields on the form and subform. Click Next.**

   The wizard needs to know how the records in the subform relate to the records in the main form, as shown in Figure 3-12. It displays a list of the relationships known, and this list usually contains the right relationship. For example, in Figure 3-12, the wizard suggests `Show Order Details for each record in Orders Main Qry using OrderID` — it uses the `OrderID` field in the Order Details table to match the `OrderID` field in the Orders Main Qry query (the record source of the main form).

   If you choose the Define My Own option, the wizard's window changes to allow you to choose the matching fields on the form (the "one" side of the relationship) and the subform (the "many" side).



SubForm Wizard

Would you like to define which fields link your main form to this subform yourself, or choose from the list below?

● Choose from a list. ○ Define my own.

Show Order Details for each record in Orders Main Qry using OrderII
None

Figure 3-12: Tell the SubForm Wizard how the records in the subform relate to the records in the main form: What fields match?

8. **Type a name for the subform or accept the wizard's suggestion. Click Finish.**

   The wizard creates the subform as a separate form in your database. It also creates a subform control on the main form, as shown in Figure 3-13. You can adjust the edges of the subform control by dragging them.

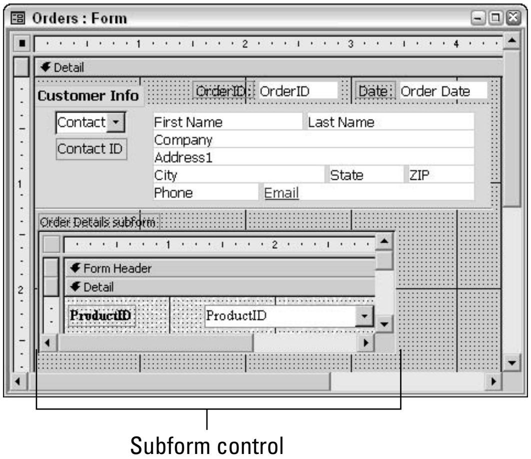


Figure 3-13: A subform control displays the subform in Design view.

The subform may look totally wrong in Design view but fine in Form view. The subform appears in Datasheet view when the main form is in Form view, so the exact placement of the controls, background color, and other features doesn't matter.

To adjust the column widths of the subform, which is usually in Datasheet view, just drag the column dividers left or right in Form view. After you have nice-looking columns, switch the main form back to Design view and adjust the width of the subform control until it's the right size to fit your columns.

The properties of subform controls

After you create the subform, you edit it from the main form or in its own Design View window. In the Database window, you can click the Forms button to see your list of forms, select the form you want to edit, click the Design button, and make your changes. When you save the changes and reopen the main form, you see the changes in your subform, too. However, updating a subform's design is easier: Open the main form in Design view and double-click the subform control. Now you can edit the subform right within the main form. When you save your main form, Access saves changes to your subform, too.

While you're fooling with the fields on the subform, you may want to change the properties of the subform control that displays the subform on the main form. To see the properties of the subform control, display the main form in Design view, display the Property sheet by clicking Design➪Tools➪Property Sheet button from the Ribbon, and then click in the subform.

REMEMBER

Don't click in the gray box in the upper-left corner of the subform, or you end up seeing the properties of the form you're using as a subform, rather than the properties of the subform control.

At this point, the box at the top of the Property sheet should show the name of the subform control; if it doesn't, click the drop-down list and choose the subform control name.

Some useful entries you can change on the Property sheet for the subform control are the following:

- **Source Object:** The name of the form you're displaying in this subform control.
- **Link Child Fields:** The field name in the record source of the subform. This field must match the `Link Master Fields` field.
- **Link Master Fields:** The field name in the record source of the main form. This field must match the `Link Child Fields` field.

Other properties have to be changed in the subform itself. Open the subform in Design view and click the Properties button to display the properties of the form. Or, with the main form open in Design view, click the subform control to select it, and then click the gray box in the upper-left corner of the subform to select the form properties. Some properties you may want to change are

- **Default View:** The default setting is Datasheet view, in which the subform appears as a small datasheet of records. You can change the `Default View` property to the `Continuous Forms` setting if you prefer: Then you simply adjust the layout of the subform to make it look right.
- **Navigation Buttons:** If a subform doesn't show many records, you may not want to waste space on navigation buttons. Having two sets of navigation buttons — one for the subform and one for the main form — can be confusing, too. However, without navigation buttons, you have to click or use the keyboard to move from record to record in the subform.

WARNING!

If you're editing the properties of a subform in Design view of the main form, click elsewhere on the main form to tell Access to update the subform properties. Otherwise, your changes don't appear to have taken effect when you switch to Form view.

Adding Form Headers and Footers

Normally, a form contains one section: the Detail section. You can see the Detail header at the top of the Design View window (take a look at Figure 3-13, for example). You can usually ignore this section header (and the idea that forms have sections at all).

However, you may want to display information at the top and bottom of your form. Yes, you can just put controls at the top and bottom of the Detail section of your form, and most people do just that. However, if the window displaying the form is too small for the whole form to fit, the information may not always be visible.

You can add a Form Header and Form Footer section to your form by opening the form in Design view, right-clicking on the form or report where you want the object, and choosing Form Header/Footer. (You can get rid of the sections by giving the same command again.) Access creates a new, blank Form Header section at the top of the Design View window and a matching new, blank Form Footer at the bottom. Next, you can add controls to these sections, using the tools found in the Controls group of the Design tab on the Ribbon or the Field list.

When you switch to Form view by clicking the View button, the controls in the header and footer sections are always visible, no matter what the size of your Form window.

Creating Tabbed Forms

Sometimes you need to fit tons of information on a form, and you can see that the form is getting to be the size of Nebraska. In addition to not fitting on the screen, large forms are confusing: Where is the right box in which to type this information?

One way to fit lots of information on a form while keeping the window size down and making the form less confusing is to divide the form up into tabs. We're talking about the kind of tabs that stick up from the tops of folders. Lots of dialog boxes have them: Take a look at the Property sheet for a nice example. Your forms can have tabs, too, with different controls on each one. The entire form can be on the tabs, or the tabs can occupy part of the form, with controls that remain visible regardless of which tab you're looking at. (We recommend the latter approach.)

To create tabs, you create a *tab control* on the form, and then you create controls on the tab. Before you start, decide how many tabs you want, and what controls go on each tab. Then follow these steps:

1. **With your form open in Design view, make some space on your form where you want the tabs to go.**

   If your form is already crowded, just expand the form outrageously by dragging its bottom edge downward, and drag groups of controls out of the way of your new tabs.

2. **Click the Tab Control button from the Controls group of the Design tab of the Ribbon.**

3. **Click in the form where you want the upper-left corner of the tabs to appear.**

   Access creates a tab control and two tabs (also called *pages*), usually named Page1 and Page2, as shown in Figure 3-14.

4. **Drag the edges of the tab control to fix the size of the control.**

   If you want to move the whole tab control, click the first page (usually Page1) so it's selected, and drag the black handle that appears in its upper-left corner.

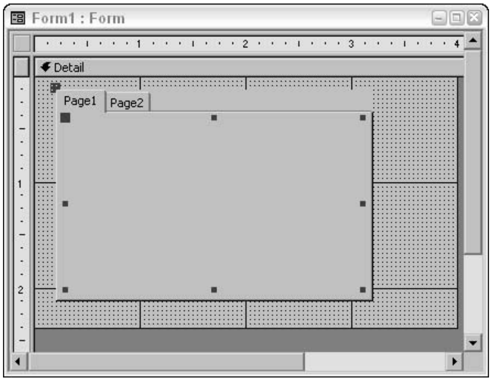


Figure 3-14: The Tab Control button creates tabs on your form.

After you have a tab control, the things you can do with it are as follows:

- **Rename the pages:** Page1 and Page2 are probably not what you want to call your tabs. Click the tab to select the page, display the Property sheet by clicking the Properties button on the toolbar, and change the `Name` property on the Property sheet.
- **Add, delete, or reorder the pages:** If you want more than two pages, right-click the tab control (or any of its pages) and choose the Insert Page option from the shortcut menu that appears. To delete a page, select it, right-click it, and choose the Delete Page option from the shortcut menu. To switch the order of the pages, right-click any of the pages and choose the Page Order option; on the Page Order dialog box that appears, use the Move Up and Move Down buttons to reorganize the list of pages.

- **Put controls on the pages:** This is the good part — you can drag existing controls from the rest of the form, or you can create new controls on the form in the same way you create controls for the rest of the form. Click the page on which you want to put the controls, so the page appears "on top." Then move or create the controls you want.

Figure 3-15 shows a form with three tabs in Design view.

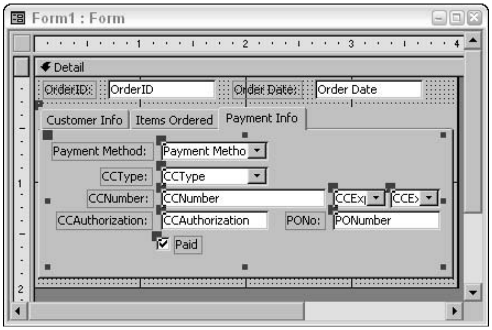


Figure 3-15: This tab control contains three pages, and each page contains controls.

You Can't Type That Here!

The main purpose of forms is to provide easy-to-use on-screen display and editing for your records. Most people use forms rather than datasheets for entering and editing data. Book II, Chapter 5 describes how to create defaults and validation rules for your tables, to prevent the dreaded "garbage in, garbage out" syndrome that so many databases suffer from. You can add validation to your form controls, too.

Use validation in your tables when you want data to follow rules all the time, no matter how it is entered. Use validation in form controls when you want to validate one field against another. For example, you may want to make sure the `Ship Date` can't be earlier than the `Order Date`, which you can't enforce using field validation in the table design.

Form controls that display data have properties with which you can validate and format that data. In fact, they are the very same properties that you can set as part of your table design:

- **Default Value:** The starting value for this field when you add a new record.
- **Input Mask:** A pattern for field data to follow, including where letters, numbers, and punctuation appear, and how letters are capitalized.
- **Validation Rule:** A rule Access applies to values entered in this field.
- **Validation Text:** An error message you see if you try to enter data that breaks the validation rule.

These settings appear on the Data tab of the Property sheet for controls. For help with creating input masks and validation rules (which can be a little complicated, frankly), click in the setting on the Property sheet and then click the Build button (to the right of the setting). For input masks, you see the Input Mask Wizard, and for validation rules, you see the Expression Builder. (For details about using these settings, see Book II, Chapter 5.)

Making Switchboards — A Friendly Face for Your Database

If you use an Access template to create your database, the database probably includes a special kind of form called a switchboard. *Switchboards* are forms that contain buttons for different database maintenance tasks, usually including adding records, printing reports, and closing the database. For example, if you use the Contact Management template to create a database, you see the switchboard shown in Figure 3-16 when you open the database. Choosing Enter/View Other Information displays another switchboard with other options, and choosing Preview Reports displays a switchboard listing the reports that the template created. Very nice!

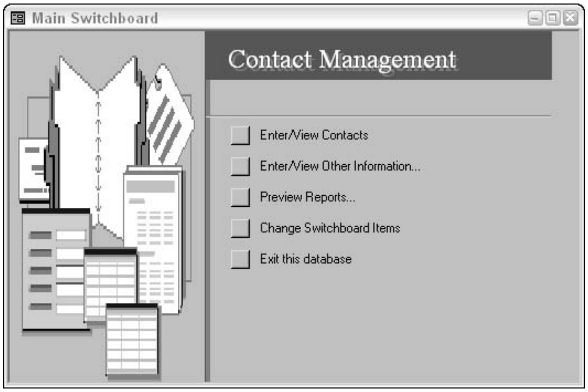


Figure 3-16: A switchboard serves as Mission Control for your database.

The secret life of switchboards

A switchboard is a special kind of Access form. One form, called Switchboard (good choice of names, we thought), appears in the list of forms in the Database window. To open the main switchboard, double-click the Switchboard file name on the Forms list in the Database window. You can't open the other switchboards directly from the Database window — you must open them from the main switchboard.

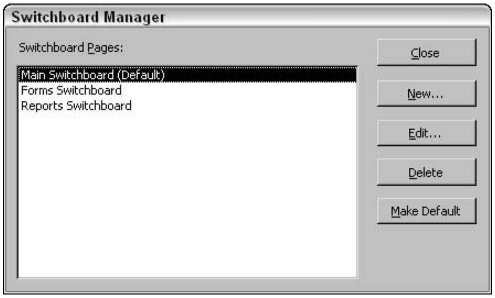
You may want to make changes to the switchboards in your databases. For example, if you create a few really useful reports, adding them to the Preview

Reports switchboard is a good idea. You can open a switchboard in Design view to make changes. However, the list of buttons and what they do is stored in an unusual (and clever) way — your database includes a Switchboard table with one record for each switchboard button. There's one table for the buttons on all your switchboards. When Access displays a switchboard, it uses the information in the Switchboard table to create the buttons and the labels next to them.

You can edit switchboards by using Design view or by editing the values in the Switchboard table, but we don't recommend it. Instead, you can use the Switchboard Manager to create and edit switchboards.

Switchboard Manager, boss of the switchboards

To start the Switchboard Manager (shown in Figure 3-17), from the Ribbon, choose Database Tools➪Database Tools➪Switchboard Manager. You see a list of the switchboard pages. (*Switchboard pages* are the different switchboards that appear in this database; Access thinks of them as different pages of the same switchboard. Whatever!)



Main Switchboard (Default)
Forms Switchboard
Reports Switchboard

Figure 3-17: Use the Switchboard Manager to change your switchboards or to create new ones.

The Switchboard Manager lists all the switchboard pages. One of the pages is shown as the default; this page is the starting page — the page that appears first, and from which you can display all the other pages. The default page usually has a name like Main Switchboard.

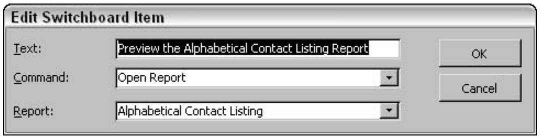
If you want to change the entries on a switchboard, follow these steps:

1. **Display the Switchboard Manager by choosing Database Tools➪Database Tools➪Switchboard Manager from the Ribbon.**
2. **Select the switchboard page you want to change, and click the Edit button.**

   You see the Edit Switchboard Page window, with a list of the items (buttons) on the switchboard.

3. **To edit what a switchboard button does or what its label says, click the entry on the Items on This Switchboard list and click the Edit button.**

   The Edit Switchboard Item dialog box appears, as shown in Figure 3-18.



Text: Preview the Alphabetical Contact Listing Report

Command: Open Report

Report: Alphabetical Contact Listing

Figure 3-18: Change what switchboard buttons do and what their labels say.

4. **Change the entries for the item and click OK.**

   You can edit the contents of the Text box to change the label that appears next to the button. To change what the button actually does, choose a different Command entry. For most commands, you see a third entry in which you can specify more information about the command (for example, which switchboard page to open or which report to print).

5. **To get rid of a switchboard button, select it, click the Delete button, and click the Yes button to confirm the deletion.**

6. **To create a new switchboard button, click the New button.**

   The Edit Switchboard Item dialog box appears.

7. **Specify the text (label for the button), command (what the button does), and other information. Then click OK.**

   The new button appears on the Items on This Switchboard list.

8. **To change the order of the buttons on the switchboard, select a button and click the Move Up or Move Down button.**

9. **Click the Close button to return to the Switchboard Manager window.**

   You see the list of switchboard pages again.

10. **If you want a different page to be the default (starting) page, select it and click the Make Default button.**

    The default page should have buttons that display each of the other pages. Otherwise, you have no way to display the other switchboard pages. Most default pages also have an Exit This Database button.

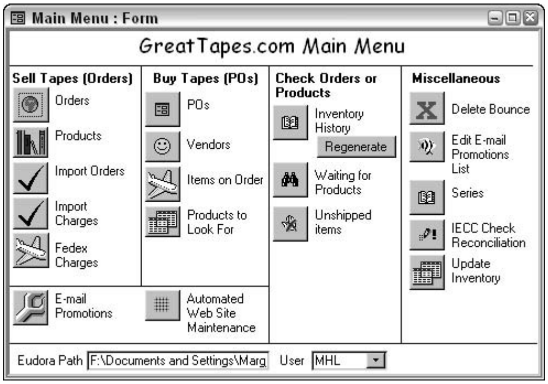
11. **When you finish making changes, click the Close button.**

The alternative to switchboards

You don't have to use switchboards to make a main menu form for your database. You can use a regular old form with command buttons on it instead.

To make a main menu form, create an unbound form (a form for which the `Record Source` property for the form is blank). (See Chapter 1 of this minibook for how to set the record source of a form.) Use labels to give the form a title (such as "Main Menu") and create a command button for each command you want available on the form.

Many people use a one-record table to contain constants about their businesses or projects (see Book I, Chapter 3). If you use this trick, you may want to set this table as the record source of your main menu form. The form shown in Figure 3-19 contains two controls at the bottom of the form, showing data from a Constants table. These controls make seeing and editing these values easy for a database user.



Eudora Path F:\Documents and Settings\Marg User MHL

Figure 3-19: You can use a regular form with lots of command buttons as a main menu, too.

Chapter 4: Doing Calculations in Forms (and Reports)

In This Chapter

- **Including calculated results on your forms (and reports)**
- **Using numbers in calculations**
- **Using dates in calculations**
- **Using strings, that is, text in calculations**
- **Totaling and counting information from subforms (and subreports)**

The first three chapters in Book IV explain how to make forms with all kinds of controls, showing information in all kinds of ways. In the process, you find out how to create reports, because creating and editing reports is so similar to working with forms. However, up to this point all the information we deal with is sitting there waiting for us, nicely contained in tables and queries. How about calculating data that isn't stored anywhere? Your forms and reports can calculate and display information, which you can also store in the record source for the form (that is, store the results so you can use them in other objects). For example, you may want the Order form for an online store to calculate the total price of all items ordered, the sales tax, and the grand total for the order.

In addition to calculating numbers, you can also do text, date, and logical calculations. For example, you can give Access instructions such as, "If `Tax Exempt` is `True`, then `Sales Tax` is `0`; otherwise it's `Tax Rate` times `Product Total`." Text calculations include things such as keeping only the first five digits of a ZIP code, or capitalizing a text entry.

Doing Elementary Calculations

Sounds like algebra class, doesn't it? Don't worry; creating calculated values for your forms won't cause you to scream in terror like your high school algebra teacher did. You'll recognize some arithmetic signs (especially the equal sign), but the calculations are all easy.

A *calculated value* is a value that Access creates by doing a calculation based on other information, usually using fields from your tables. For example, Access can add the product total to the shipping cost for an order, to come up with the total cost.

To include a calculated value on a form or report, create a text box and then enter an expression in the `Control Source` property of the text box. An *expression* is a formula that tells Access how to calculate an answer from field values and other values. Expressions start with an equal sign (=). If field names include spaces, enclose them in square brackets. (Actually, we enclose *all* field names in square brackets, just so we don't forget.) For example, this is an expression:

```
= [Product Total] + [Shipping Cost]
```

And here's another one:

```
= "Your total will be " & [GrandTotal] & "."
```

The expressions you use on forms and reports are the same as the expressions you use to create calculated fields in queries. Turn to Book III, Chapter 3 for how expressions work in queries, including the operators and functions they can include.

Making a calculated control

A *calculated control* is a control that uses an expression, rather than the field name, as its `Control Source` property (as explained in Chapter 2 of this minibook). Usually, it's a textbox control. To create a calculated control, follow these steps:

1. **With the form or report open in Design view, choose Design➪Controls➪Text Box from the Ribbon.**

   For an introduction to the tools in the Controls group, see Chapter 1 of this minibook. You have to use the tools from the Controls group, rather than the Field list, to create a control with a blank control source. (A control with no control source is called an *unbound control*.)

2. **Click the form where you want the text box, or drag from one corner to the other in the space where you want the text box to appear.**

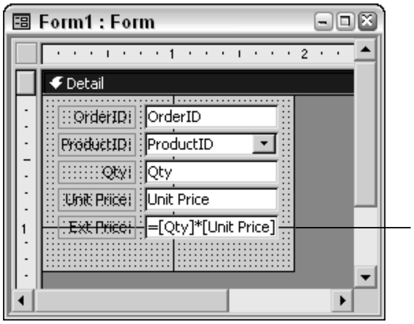
   A text box appears, with `Unbound` showing in it. The control has no Control Source — Access doesn't know what to display in the text box.

3. **Display the Property sheet for the control by clicking the Property Sheet button on the toolbar. Click the Data tab on the Property sheet that appears.**

   The `Control Source` property is the first property on the Data tab — and lo! It's blank.

4. **Type an expression in the `Control Source` property of the text box.**

   You can click in the text box on the form and type the expression, as shown in Figure 4-1. Or click in the `Control Source` property on the Property sheet. Your choice.



=[Qty]*[Unit Price]

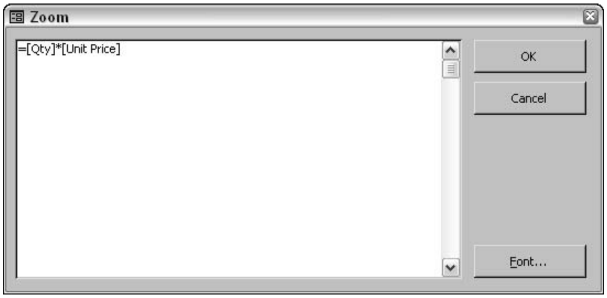
Expression

Figure 4-1: When you type an expression as the value of a text box, be sure to start it with an equal sign.

If you want to edit the expression later, you can change your entry on the Property sheet.

Another way to enter or edit an expression is to click the Build button — the button to the right of the Control Source box — or press Ctrl+F2 to run the Expression Builder, which steps you through writing an expression. See Book III, Chapter 3 for how the Expression Builder works.

Expressions can get long, and it can be hard to see them. When editing an expression, press Shift+F2 to display it in a Zoom box, as shown in Figure 4-2.



=[Qty]*[Unit Price]

Figure 4-2: A Zoom box displays an expression.

Don't name the text box control with the same name as a field in the record source for the form or report! For example, if the table or query that provides the records has a field called `Full Name`, don't create a calculated text box with that name. Two items with the same name confuse Access if you refer to that name — Access doesn't know whether you want the field or the control.

Should you put your calculations in queries or on forms and reports?

When you want to include a calculated value in a form or report, you can do it in one of two ways:

- In a query, which you use as the record source for the form or report
- In a text box control on the form or report

Both methods work fine. If you plan to use the calculated value to select which records to include in the form or report, you need to calculate the value in a query, and then set the Sort row for that field to ascending or descending. We usually calculate values in a query if we plan to sort or select by the calculation, or display the calculation in more than one form or report.

Checking your expression

WARNING!

After you type an expression into the Control Source property of a text box (or use the Expression Builder to create it), you see the expression itself in the text box. What about the answer?

To check whether the expression works, switch to Form view by clicking the View button or by choosing Views➪Form View from the Form Layout Tools tab on the Ribbon. (For reports, switch to Print Preview.) Check the answer in several records to see whether the expression works as you expect.

Troubleshooting expressions

If you make a mistake in your expression, you may see one of three things in Form view or Print Preview: a wrong answer, #Name?, or another error message that starts with a #. If you find an error, check out these ideas for fixing your calculated text box and its expression:

- #Name? indicates that Access can't understand a field name in your expression. The most likely reason is that you forgot the equal sign (=) at the beginning of the expression. Or you may have misspelled a field name, or you may have forgotten to enclose it in square brackets. If your text box control has the same name as a field, Access can't tell which one you're referring to, so check the name of the text box, too. (It's the Name property on the All tab of the Property sheet.)
- #Div/0! means you're dividing something by zero, which is impossible in standard arithmetic. Check the fields in your expression to see if one might be zero for some records.
- #Error indicates some other problem — check the expression carefully.

Calculating and Formatting Numbers

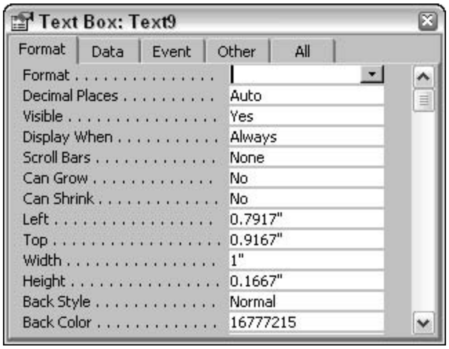
To display a numeric calculation on a form or report, you can use the arithmetic operators that we describe in Book III, Chapter 3. Access also has numeric functions, described in the same section.

Some sample numeric expressions (you can guess what the fields contain from their names) are included in the following table.

Numeric Expression	*Purpose*
`=[TaxableTotal]*[SalesTaxRate]`	Sales tax on an order
`=3.50 + ([ItemCount] * 2)`	Shipping is $3.50 plus $2 per item
`=[OrderSubtotal] + [SalesTax] + [Shipping]`	Grand total for an order

After you type an expression in the `Control Source` property of a text box and switch to Form view or Print Preview to check that it works, you usually want to format the number — you may not like the number of decimal places, use of commas, or lack of a currency symbol in your calculated text box.

To format a number, display the properties of the text box and click its Format tab, as shown in Figure 4-3. For a text box with numeric values, you can click in the `Format` property and click the down arrow at the right end of the property to see a list of numeric formats. Details about numeric formats are in Book II, Chapter 1 — they are the same formats you can use to format the fields in your tables.



Format	
Decimal Places	Auto
Visible	Yes
Display When	Always
Scroll Bars	None
Can Grow	No
Can Shrink	No
Left	0.7917"
Top	0.9167"
Width	1"
Height	0.1667"
Back Style	Normal
Back Color	16777215

Figure 4-3: Formatting a calculated value in a text box.

Calculating and Formatting Dates

Access includes operators and functions that work on dates, including finding the number of days between two dates, separating a date into its component parts (day, month, year, hour, minute, and second), and adding days to a date. Book III, Chapter 3 describes the operators and functions you can use. A few examples are in the following table.

Date Expression	Purpose
`=DateDiff("w", [OrderDate], [ShipDate])`	Number of weeks between ordering and shipping
`=[InvoiceDate] + 30`	30 days after the invoice date
`=Date() + 10`	10 days after today
`=DatePart("q", [OrderDate])`	Quarter in which order was placed

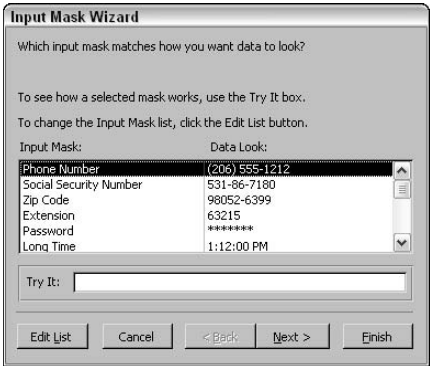
Access gives you lots of date formats to choose from, as listed in Book II, Chapter 1.

Calculating and Formatting Text

For forms and reports, you want things to look just right, and text expressions allow you to do all kinds of things to slice and dice the text that appears in your text boxes. Book III, Chapter 3 describes the operators and functions you can use with text values. A few examples are in the following table.

Text Expression	Purpose
`=[FirstName] & " " & [LastName]`	First and last names, with a space in between
`=[LastName] & ", " & [FirstName]`	Last name first, then first name, with a comma in between
`=UCase([LastName])`	Last name, in all capital letters
`=Left([ProductCode], 2)`	First two characters of the product code

You can create a so-called *input mask* that determines the formatting of a calculated text box, as we describe in Book II, Chapter 1. For example, an input mask can add parentheses and dashes to a phone number, or dashes to a Social Security number. A nifty way to explore input masks is to click in the `Input Mask` property on the Data tab of the Property sheet for your text box, and then click the Build button to its right. The Input Mask Wizard runs and shows you a list of input masks you can use, as shown in Figure 4-4. (See Book II, Chapter 5 for more information on input masks.)



Input Mask Wizard

Which input mask matches how you want data to look?

To see how a selected mask works, use the Try It box.

To change the Input Mask list, click the Edit List button.

Input Mask:	Data Look:
Phone Number	(206) 555-1212
Social Security Number	531-86-7180
Zip Code	98052-6399
Extension	63215
Password	*******
Long Time	1:12:00 PM

Try It:

Figure 4-4: The Input Mask Wizard helps format text in a form or report.

Displaying Values That Depend on Conditions

Some calculations have an *if-then* component — basically, *if* this is true, *then* we do this. For example, if the order is from your home state, then charge sales tax; otherwise, don't. Or if the order is above $100, then shipping is free. Access handles these types of if-then calculations using its `iif()` `(immediate-if)` function, which we describe in Book III, Chapter 3.

For example, if you charge sales tax only for Vermont orders, then you use this expression:

```
= iif([State]="VT", [TaxableTotal]*.05, 0)
```

The condition `([State]="VT")` is either true or false; if it's true, the expression is `[TaxableTotal]*.05` (5 percent of the taxable total); if it's false, the expression is `0`.

The condition can be a Yes/No field: if the field is `Yes` (true), the function returns the first value, and if it's `No` (false), you get the second value. For example, the following expression looks at the Yes/No field, `TaxExempt`, to determine whether this customer is exempt from sales taxes. For taxable customers, the function returns the value of the `TaxableTotal` field. For tax-exempt customers, it returns zero:

```
= iif([TaxExempt], 0, [TaxableTotal])
```

Here's the mind-boggling part: You can *nest* functions, including the `iif()` function — that is, you can use a function inside another function. The following expression (for example) combines the last two examples to calculate sales tax based on both the customer's tax-exempt status and the customer's state:

```
= iif([State]="VT", iif([TaxExempt], 0, [TaxableTotal]*.05), 0)
```

Adding Subtotals and Totals from Subforms

If your form includes a subform (or your report includes a subreport), and the information shown in the subform includes quantities, you may want to display a total on the main form. For example, on an Orders form that contains an Order Details subform, the main form can include the total cost of all the items in the subform, and maybe a count of the records in the subform. Figure 4-5 shows an Orders form with a subform listing the items that the customer is buying.

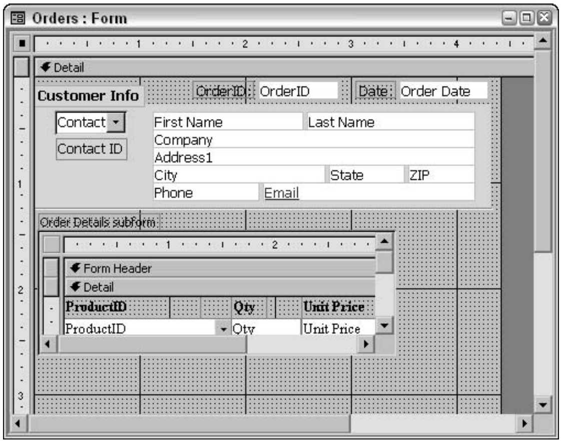


Figure 4-5: Wouldn't it be nice if the Orders form could include a total of the cost of the items in the Order Details subform?

Unfortunately, you can't make a control on the main form that calculates a total for the records on the subform. You can, however, make a control on the subform that calculates the total, and then make a control on the main form that displays the value of this control. Seems like an extra step to us, but it works. The following sections cover what you need to know to create totals and counts of subform records.

Using aggregate functions

An *aggregate function* is a function that combines a bunch of values together. For example, the `Sum()` function adds a bunch of numbers together. (Simple enough!) When doing calculations based on a bunch of records, you can use the aggregate functions outlined in the following table.

Function	*Description*
`Sum()`	Totals the values
`Count()`	Counts the values
`Avg()`	Averages the values (sum divided by count)

Function	Description
`Min()`	Calculates the smallest value (for numeric values), the earliest date (for date values), or the first value in alphabetical order (for text values)
`Max()`	Calculates the largest value (for numeric values), the latest date (for date values), or the last value in alphabetical order (for text values)
`First()`	Uses the value from the first record
`Last()`	Uses the value from the last record

Aggregate functions work only where Access knows what set of records you want to work with. On forms, they work in the form footer of a subform. (See Chapter 3 of this minibook for a description of a form footer, unless you already guessed that a *form footer* is a section that appears at the bottom of a form.)

For example, in Figure 4-5, the total of the `Qty` field in the Order Details subform tells the shipping clerk how many items need to be shipped for this order. The expression is

```
= Sum([Qty])
```

If a field name contains spaces, you have to enclose it in square brackets. We enclose all field names in square brackets, just to be safe.

You can also total a calculation. To come up with the total cost of the items ordered, you use this expression:

```
= Sum([Unit Price] * [Qty])
```

If you want to total, average, or count all the records in an entire table or query, or selected records in a table or query, use the functions described in the sidebar, "Summarizing lots of records."

Referring to a control on a subform

To create a control on the main form that shows information from the subform, you need to know how to refer to a control on the subform. The format of an expression that displays a value from a subform is the following:

```
= [subform control name].Form![control name]
```

(This looks hideous, but hold on!) Replace *`subform control name`* with the name of the subform control on the main form that displays the subform. Replace *`control name`* with the name of the text box on the subform that displays the value you want to see.

Summarizing lots of records

In addition to the functions that work with the field values in the current record, Access has *domain aggregate functions* — functions that work with field values in some or all of the records in a table or query. (A *domain* is a fancy name for a table or query.) For example, you may want a form to display the grand total of all the orders so far this year, or the amount of the largest order placed. To total the value of a field for a bunch of records, you use the DSum function, which has this syntax:

```
DSum(expression, domain,
   criterion)
```

Replace *expression* with the field name that you want to total (or an expression such as [Price] * [Qty]), in quotes. Replace *domain* with the table or query name, in quotes. Optionally, you can include a *criterion* that limits which records to include.

For example, the following expression totals the extended price (price times quantity) for all the records in the Order Details table:

```
DSum("[Price] * [Qty]", "Order
   Details")
```

Some of the other domain aggregate functions you can use (they have the same syntax as DSum) are

- DAvg: Averages the values
- DCount: Counts the values
- DFirst: Value for the first record
- DLast: Value for the last record
- DMin: Minimum value (for numbers it's the smallest; for text it's the first in alphabetical order; and for dates it's the earliest)
- DMax: Maximum value (for numbers it's the largest; for text it's the last in alphabetical order; and for dates it's the latest)

One other useful domain aggregate function is DLookup, which returns the value of a specific field for a specific record in a table or query. For example, the following expression returns the date of OrderID 5000 from the Orders table:

```
DLookup("[Order Date]",
   "Orders", "[OrderID] =
   5000")
```

In this DLookup function, the expression is "[Order Date]", the date of the order. The domain is the Orders table. The criterion is "[OrderID] = 5000" — which limits the records to include only the record with that specific ID.

For example, if your main form is the Orders form shown in Figure 4-5, its subform control is called Order Details subform. If you want to display the information from that subform's Order Subtotal text box, the expression would look like this:

```
= [Order Details subform].Form![Order Subtotal]
```

Creating the controls to total a subform

To calculate a total (or a count) of the values of a control on the subform and to display it on the main form, you create two controls: one in the form footer of the subform and one on the main form, wherever you want the total to appear.

Be careful when entering the expressions for calculating and displaying the total: In some cases, you type the name of the field while in other cases you type the name of the control that displays the field. It can get confusing!

Follow these steps to display the subform total on the main form:

1. **Open the subform in Design view and display its Property sheet by clicking the Property Sheet button.**

   If you already have the main form open in Design view, you can right-click in the subform control and choose Subform in New Window.

2. **Add a Form Footer section (assuming that it doesn't already have one) by right-clicking on the location on the form you want to add a header or footer to and click Form Header or Form Footer.**

   Figure 4-6 shows a form in Design view with header and footer sections. (See Chapter 3 of this minibook for more about form headers and footers.)

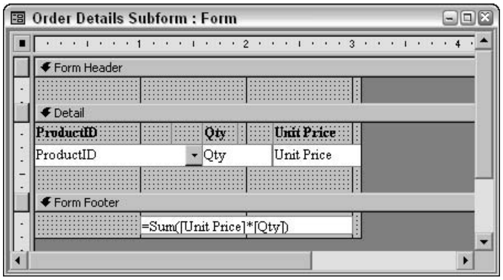


Figure 4-6: Create a calculated control in the form footer to calculate totals of records on the form.

3. **Note the name of the field (not the control on the form) that contains the values you want to count or total.**

   Frequently, the control that displays a field has the same name as the field itself, but not always. Be sure to use the field name, not the name of any control on the form that displays the field.

4. **In the Form Footer, make a text box by clicking the Text Box button on the Controls group of the Design tab of the Ribbon and clicking in the form footer.**

5. **Open the Property sheet for the text box, and enter the expression that you want to calculate in the `Control Source` property.**

   For example, type = **Sum([Unit Price] * [Qty])** into the `Control Source` property, as shown in Figure 4-6.

6. **Enter a descriptive name for the control in the `Name` property.**

   Make a note of the control name, because you need it to display the value on the main form. For example, you may name the control `OrderSubTotal`.

7. **Switch to Form view by clicking the View button, to make sure that the new text box works.**

   Because you're looking at the subform as an independent form, the subform shows all the records in its record source, and the calculation totals all the records, not just those for one order. But when this form is used as a subform, the linkage between the subform and the main form restricts the records in the subform to one order at a time, and the control totals the records for only the current order.

8. **If you plan to display the subform in Form view, not just in Datasheet view, hide the Form Footer section by setting its `Visible` property to a `No` setting.**

   Otherwise, you display the subtotal once on the subform and once on the main form, which looks odd. Most subforms appear in Datasheet view, which don't display form headers and footers.

9. **Save and close the subform.**

   Press Ctrl+S to save your changes, and go ahead and close its Design View window — you're done with it.

10. **Open the main form in Design view. Click the Property Sheet button to display the Property sheet.**

11. **Create a text box to hold the total, by clicking the Text Box button and clicking in the Design View window where you want the calculated control.**

    You get a new unbound control, ready to display your calculated total.

12. **Set the text box's `Control Source` property to an expression that refers to the calculated control on the subform.**

    For example, the expression referring to the calculated control shown in Figure 4-6 is this:

    ```
    = [Order Details subform].Form![Order Subtotal]
    ```

13. **Format the new control with the numeric format you want and switch to Form view to test it out.**

    If you don't format the text box, Access usually displays way too many decimal places for calculated values. On the Format tab of the Property sheet, set the `Format` property to the `Currency` setting, or whatever format you prefer.

If you see #Name or #Error instead of the subtotal, check the expression for the control on the main form carefully, and make sure that you entered the expression, the name of the control on the subform, and the name of the subform control — the control you put on the main form — correctly. (What a zoo!)

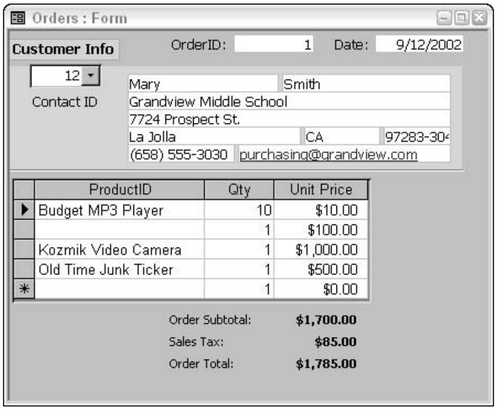
Formatting Calculated Controls

When you display calculated values on a form, the value isn't editable in Form view — that is, you can't type a different value in its place, or delete it. The expression controls what appears in the text box.

To make it clear which text boxes are editable, we like to make calculated text boxes look different from text boxes we type in. We recommend that you display the Format tab on the Property sheet for each calculated control and make the following changes:

- Set the Back Style property to the Transparent setting, so the background of the calculated value matches the background of the form itself.
- Set the Special Effect property to the Flat setting, so the value doesn't appear in a box at all.

Figure 4-7 shows the Orders form with three calculated controls at the bottom.



Orders : Form

Customer Info

OrderID: 1 Date: 9/12/2002

12

Contact ID

Mary Smith
Grandview Middle School
7724 Prospect St.
La Jolla CA 97283-30
(658) 555-3030 purchasing@grandview.com

	ProductID	Qty	Unit Price
▶	Budget MP3 Player	10	$10.00
		1	$100.00
	Kozmik Video Camera	1	$1,000.00
	Old Time Junk Ticker	1	$500.00
*		1	$0.00

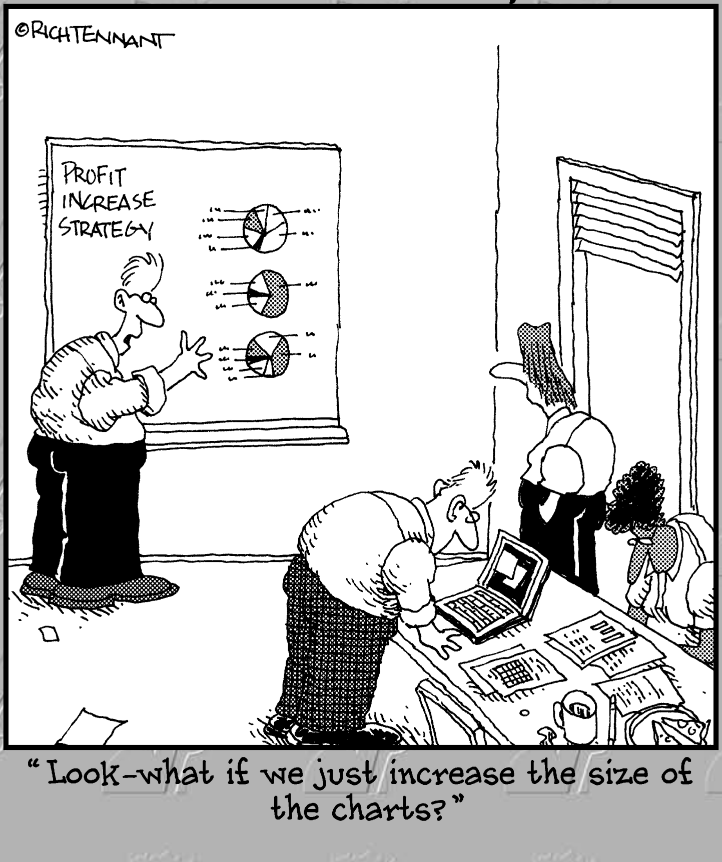
Order Subtotal: $1,700.00
Sales Tax: $85.00
Order Total: $1,785.00

Figure 4-7: Order Subtotal, Sales Tax, and Order Total are calculated controls.

Book V

Reports

The 5th Wave By Rich Tennant



“Look–what if we just increase the size of the charts?”

Contents at a Glance

Chapter 1: Creating and Spiffing Up Reports

In This Chapter

- **Getting a handle on how reports are like forms**
- **Creating reports by running wizards and AutoReports**
- **Editing reports in Design view**
- **Adding page headers and footers**
- **Creating groupings and subtotals**
- **Including subreports on your report to print information from related tables**
- **Making reports that print mailing labels**

Reports are the best way to put information from your database onto paper. In a report, you can choose how to display your data, including which information to include (which tables and fields); where to print each field on the page; text fonts, font sizes, and spacing; and printing lines, boxes, and pictures.

Reports can include information from different tables — for instance, you can display the customer information, followed by all the items that the customer has bought from all orders. The Report Wizard simplifies creating reports that list, summarize, and total your data. You can also use calculations in reports to create totals, subtotals, and other results. You can create invoices, packing slips, student rosters, and all kinds of other reports. Thanks to the trusty Label Wizard, reports are also the best way to create mailing labels from addresses in your database.

This chapter explains how to create and modify reports so they're ready to print. The next chapter talks about previewing and printing them. Chapter 3 of this minibook describes graphical reports — graphs and charts.

If You Know Forms, You Already Know Reports

Reports and forms are used very differently, but you create them in similar ways. You can create both forms and reports by running wizards. You can create or modify both forms and reports in Design view, where you can create, move, and customize controls and their properties.

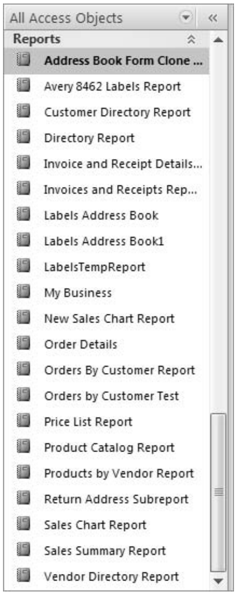
To see a list of the reports in your database — and, eventually, to open or modify a report — scroll down in the Navigation Pane until you get to the Reports section, where you'll see a nice list of all the reports in your database, as shown in Figure 1-1. If you don't see the Reports section in the Navigation Pane, click the title bar of the Navigation Pane and select All Access Objects.

You can look at a report in three views:

- **Design view:** Here's where you can look behind the scenes at what fields the report displays where.
- **Print Preview:** This view shows how the report will look when you print it.
- **Layout view:** This view looks like Print Preview, but allows you to make changes to your report.

To see a report in Design view, click its name in the Navigation Pane and click the down arrow on the View button on the Home tab of the Ribbon. You'll see a drop-down list. To see the report in Print Preview, click its name in the list. If you already opened the report in Design view, switch to Print Preview by clicking the down arrow on the View button on the Home tab and selecting Print Preview. You can also cycle between Layout view and Print Preview by clicking the View button.

This chapter describes how to make reports by running wizards, as well as how to customize reports in ways that don't work for forms. For information about how to create and customize reports in Design view, including adding controls and setting properties, see Book IV, Chapter 1.



All Access Objects

Reports

Address Book Form Clone ...
Avery 8462 Labels Report
Customer Directory Report
Directory Report
Invoice and Receipt Details...
Invoices and Receipts Rep...
Labels Address Book
Labels Address Book1
LabelsTempReport
My Business
New Sales Chart Report
Order Details
Orders By Customer Report
Orders by Customer Test
Price List Report
Product Catalog Report
Products by Vendor Report
Return Address Subreport
Sales Chart Report
Sales Summary Report
Vendor Directory Report

Figure 1-1: The Navigation Pane lists all your reports.

However, reports can include features that don't appear on forms, including these:

- **Grouping and sections:** When you design a report, you frequently want to have information grouped together. For example, a monthly sales report may list sales by product, with subtotals for each product. A mailing-label report may start a new page for each new ZIP code, and print the total number of labels that are in each ZIP code. You can have up to four grouping levels. You can add grouping levels by adding section headers to your report in Design view (see the section, "Adding sections that group your records," later in this chapter).
- **Page headers, footers, and numbers:** Most reports have page numbers and many need other information printed at the top or bottom of every page. See the section, "Adding page headers, footers, and numbers," later in this chapter.
- **Margins, paper size, and paper orientation:** Reports usually end up on paper, and you can configure your report to fit. See the section, "Creating Mailing Labels," later in this chapter, along with most of the sections in Chapter 2 of this minibook.

But first, we cover how to create some reports the easy way — by using the wizard.

Creating Reports Automagically

You create a report the same way that you create other objects in your database. Follow these steps:

1. **Display the Create tab of the Ribbon by clicking it.**
2. **Select the method you want to use to create the report by clicking one of the buttons on the Reports group of the Create tab on the Ribbon, shown in Figure 1-2.**

   Table 1-1 lists the choices on the Reports group of the Create tab.

WARNING!

Don't click New on the Microsoft Office Button menu — doing that makes a new database!

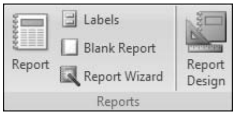


Figure 1-2: Access provides several ways to create reports.

Table 1-1 **Buttons on the Reports Group of the Create Tab**

Option	*When to Use It*	*Where to Find More Info*
Design View	When you want to design your report from scratch in Design view	See Book IV, Chapter 1.
Report Wizard	When you want Access to create a report, using the fields, grouping, and sorting that you provide	See the next section in this chapter.
Report	When you want to create a simple report based on the table or query that is currently selected. You can customize the report later.	Just click the button and Access 2007 automatically creates a report based on the currently selected table or query.
AutoReport: Tabular	When you want to create a report from one table or query and arrange the fields in a table, with field names at the tops of the columns and data from each record displayed as a row in the table (as in a datasheet).	See "Creating Simple Reports," later in this chapter.
Chart Wizard	When you want to create a chart from data stored in one table or query.	See Chapter 3 of this minibook.
Label Wizard	When you want to print data from one table or query on labels.	See "Creating Mailing Labels," later in this chapter.

Running the Report Wizard

The first step in creating almost any report is to run the Report Wizard — especially if you want to create a report that groups data using one or more fields, with headings or subtotals for each group. When the wizard finishes, you can switch to Design view and add your own formatting touches.

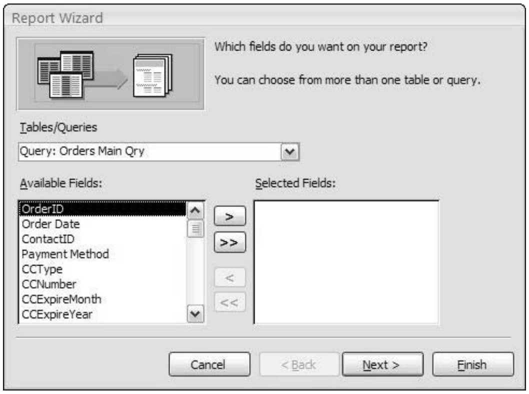
One big advantage of using the Report Wizard is that you can choose fields for the report from more than one table or query — you don't have to gather all the data you want into one query. For example, using the MOM sample database (which stores order and customer information for a mail-order store), you may want to create a report that lists all the orders for each customer. The information for this report comes from several tables: Address Book (which stores one record for each customer, including name and address), Orders (with one record for each order, including the order date), and Order Details (with one record for each item in an order, including the quantity ordered and the price per item).

If you want your report to include a calculated field, you need to create a query that calculates the field. For example, for our customer-order listing, we need the extended price (price × quantity) for each item in each order, so we can calculate the total amount of each order. (Book III, Chapter 2 shows how to create calculated fields in queries.) Alternatively, you can add a calculated control to your report in Design view. (See the "Formatting Tips and Tricks" section, later in this chapter, for a look at how this works.)

The Report Wizard asks different questions depending on the data in the record source and on options you select, so don't be surprised if you don't see every window each time you run it. Follow these steps to create a report:

1. **Click the Create tab of the Ribbon. Then click the Report Wizard button in the Reports group.**

   Access displays the first Report Wizard window, as shown in Figure 1-3.



Report Wizard

Which fields do you want on your report?

You can choose from more than one table or query.

Tables/Queries: Query: Orders Main Qry

Available Fields: OrderID, Order Date, ContactID, Payment Method, CCType, CCNumber, CCExpireMonth, CCExpireYear

Selected Fields:

Figure 1-3: The Report Wizard can build a report from one or more tables and queries.

2. **Use the Tables/Queries drop-down list to select the table or query that stores the records you want to include in the report.**

   If you plan to use information from several tables or queries, choose one of them. The Available Fields box lists the fields in the selected table or query.

3. **Select the fields you want to display in the report in the Available Fields box and add them to the Selected Fields list by clicking the > button.**

   Double-clicking a field name also adds it to the Selected Fields list. Click the >> button to add all the fields.

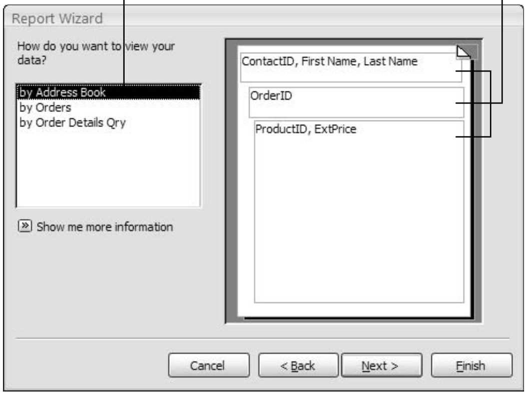
4. **Repeat Steps 2 and 3 for fields in other tables or queries until all the fields you want to include in the report appear in the Selected Fields list.**

   You can use some fields from tables and other fields from queries. For our customer-order listing, we select fields from the Address Book table, the Orders table, and the Order Details Qry query (which includes the `Ext Price` field, a calculated field that equals `Price` × `Qty`).

5. **Click Next to see the wizard's next window.**

   Access gives you a chance to choose how you want to group the data. For example, in our customer order report, grouping by customer is a good idea in order for all the information about one customer to be together. Within the section for each customer, the secondary grouping is by order, so that all the items in each order are listed together.

   If your report includes fields from more than one table or query, Access makes an educated guess about how you want to group your data, based on the relationships among the source tables. In Figure 1-4, the report includes records from the Address Book table (the customer list), the Orders table, and the Order Details Qry query, and Access has automatically created three ways of grouping your data: one by customer (Address Book table), one by order (Orders table), and one by Order Details Qry. Click an option in the How Do You Want to View Your Data list and look at the example on the right side of the window. For the selected way of grouping your data, Access shows how it plans to arrange your data in the report.



Report Wizard

How do you want to view your data?

by Address Book
by Orders
by Order Details Qry

ContactID, First Name, Last Name

OrderID

ProductID, ExtPrice

Click an option to see how the wizard plans to group your data.

The wizard shows groupings for your selection.

Figure 1-4: The Report Wizard guesses how you want to group the information in the report, based on the relationships between the underlying tables.

   In this example, if you choose the By Address Book option, the report prints information about a customer, followed by all of the customer's orders, each with its order-detail information. Then the next customer, with that customer's orders, prints.

6. **Click the option that's the closest to the way you want to organize your report, and click Next.**

The guesses Access makes about how to group data are not always on the mark, so the wizard gives you a chance to make your own changes, as shown in Figure 1-5.

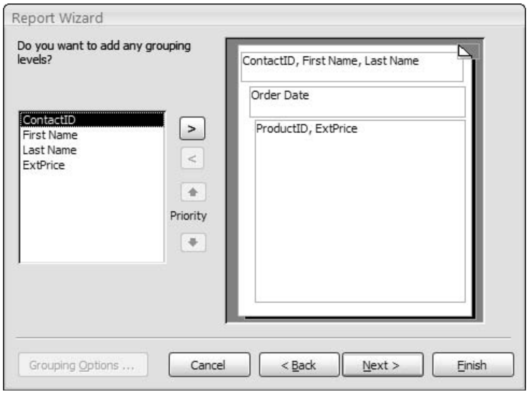


Figure 1-5: You can adjust how the Report Wizard plans to group the records in your report.

7. **Add or change the grouping fields if you want, and then click Next.**

   The wizard displays the grouping levels that you chose in the previous step on the right side of the window. To add an additional level of grouping, select a field from the list and click the > button. You can remove it by selecting it and clicking the < button. Here are some handy things to know about groups:

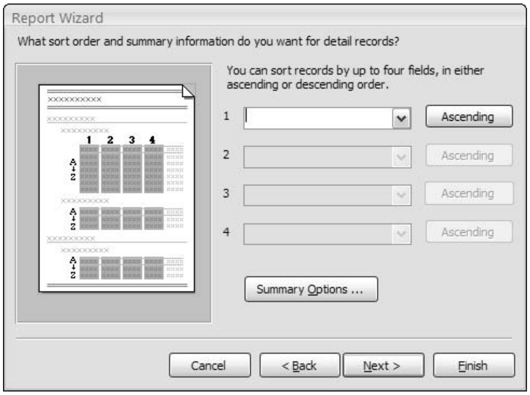
   - You can't change the groupings that the wizard created in Steps 5 and 6. Instead, you have to click the Back button and choose a different way to group your records.
   - After you add a field, you can change the importance (grouping level) of a field by selecting the field and clicking the up-arrow and down-arrow Priority buttons (refer to Figure 1-5).
   - In the customer-order report, the wizard's suggested groups are right, so you wouldn't have to make any changes.
   - Clicking the Grouping Options button (which is not always available, depending on your groupings) displays the Grouping Intervals dialog box. There you can specify exactly how to group records using the fields you choose.
   - For date fields, you can group by day, month, or year. For number fields, you can group by 10s, 50s, 100s, 500s, 1,000s, 5,000s, and 10,000s so you can categorize values by magnitude.
   - For text fields, you can group on the first 1, 2, 3, 4, or 5 characters. Click OK to exit the Grouping Intervals dialog box and return to the main wizard window.

8. **Choose how you want to sort the records within the lowest-level grouping, and click Next.**

   Access automatically sorts by the fields on which you are grouping records. For example, if you are grouping records by customer and then by order, the customers appear in alphabetical order by name or in order of customer number. Within the lowest level of grouping, you can choose what order the records appear in — and specify up to four fields on which to sort. If you aren't grouping your records at all, you can still sort them here.

   Click in the `1` box (shown in Figure 1-6), choose a field, and click the Ascending button if you want to switch to a descending sort. Additional sort fields are used only when the `1` sort field is identical in two or more records — in which case, the `2` field is used. If the `1` and `2` fields are identical in two records, Access sorts by the `3` and then the `4` field.

   In the customer-order report, you don't need to sort your records — the groupings take care of all the sorting you need.



Report Wizard

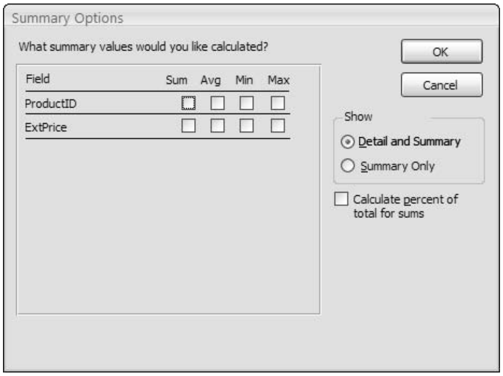
What sort order and summary information do you want for detail records?

You can sort records by up to four fields, in either ascending or descending order.

Figure 1-6: You can sort the records in your report within the lowest-level grouping.

9. **Click the Summary Options button if you want to print counts, averages, or totals; specify which numeric fields to summarize; choose between the Detail and Summary and the Summary Only options; then click OK and click Next.**

   Access displays a list of the numeric fields in your report, with a check box for Sum (total), Avg (average), Min (minimum or smallest value), and Max (maximum or largest value), as shown in Figure 1-7. If you want only the summary values, without information for individual records, click the Summary Only radio button. If you want Access to calculate the percent of the total that each grouping represents (for example, the percentage of orders that each customer represents), click the Calculate Percent of Total for Sums check box.



Summary Options

What summary values would you like calculated?

Field	Sum	Avg	Min	Max
ProductID	□	□	□	□
ExtPrice	□	□	□	□

Show
● Detail and Summary
○ Summary Only

□ Calculate percent of total for sums

Figure 1-7: The Report Wizard can add totals, subtotals, averages, percentages, and other summary statistics to your report.

TIP

In the customer-order report we're cooking up here, you click the Sum check box for the `Ext Price` field if you want to get a total of the items in each order and for each customer.

10. **Choose the layout for your report from among the Access canned layouts, and click Next.**

    You can preview the layout options by clicking one of the Layout radio buttons. The sample box on the left changes to show what your chosen layout looks like. If you want to print your report sideways on the paper, click the Landscape radio button.

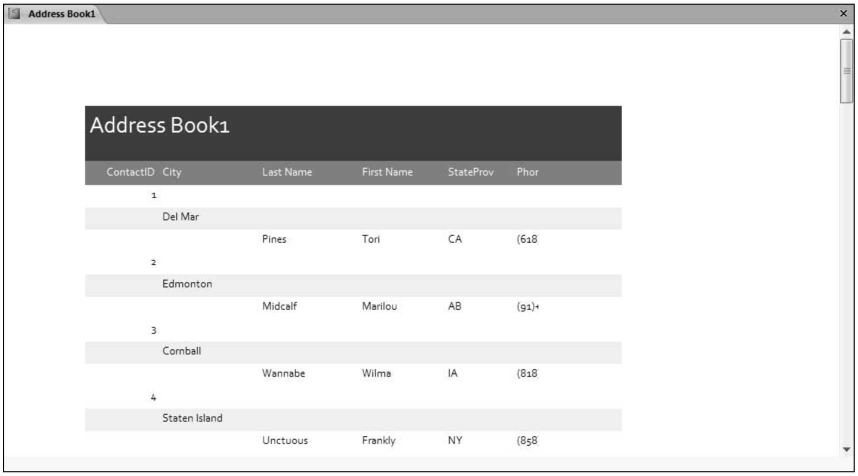
11. **Choose the style — typefaces, colors, lines, and boxes — for your report, and click Next.**

    Access has many preset styles to choose from. Click a style to see a sample.

12. **Type a title for the report. Choose whether to display the report in Print Preview or in Design view, and click Finish.**

    The title appears at the top of the report. The Report Wizard takes a moment to create the report, and then displays it in the view you chose.

The report may look close to perfect, or it may look like a complete wreck. For example, the customer-order report as created by the Report Wizard contains the right information, but it looks lousy (take a look at Figure 1-8). Luckily, you can switch to Design view to fix it up. Click the View button on the Ribbon or choose View➪Design View. Then see Book IV, Chapter 1 for how to make changes in Design view.



Address Book1

ContactID	City	Last Name	First Name	StateProv	Phor
1					
	Del Mar				
		Pines	Tori	CA	(618
2					
	Edmonton				
		Midcalf	Marilou	AB	(91)-
3					
	Cornball				
		Wannabe	Wilma	IA	(818
4					
	Staten Island				
		Unctuous	Frankly	NY	(858

Figure 1-8: The Report Wizard's creation rarely looks right on the first try.

Creating Simple Reports

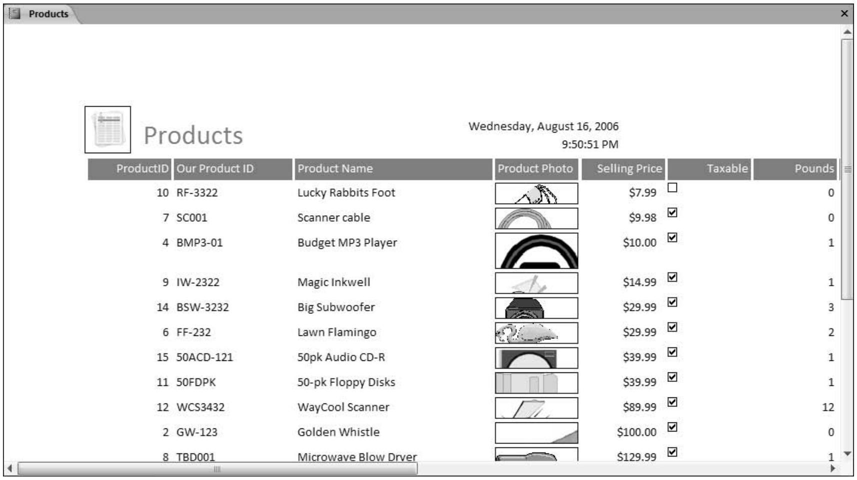
Access 2007 provides a Simple Report Tool that you can use to create a report using the data from a single table or query. The Simple Report Tool doesn't allow the flexibility that the Report Wizard provides — you can't group data from related tables, for example — but it is an excellent way to get your data into a report quickly. After you create a report using the Simple Report Tool, you can customize it as you would any other report — just open the report in Design view and have at it.

The Simple Report Tool creates a nicely formatted tabular report that looks similar to a datasheet, with data in columns and field names as the column headers, as in Figures 1-9 and 1-10.

To create a report using the Simple Report Tool, follow these steps:

1. **Click the Create tab on the Ribbon.**
2. **In the Navigation Pane, choose the table or query from which you want the data to come.**
3. **Click the Report button in the Reports group of the Ribbon.**

Access creates a report in tabular format, containing all the fields and records in the table or query, and displays it in Layout view.



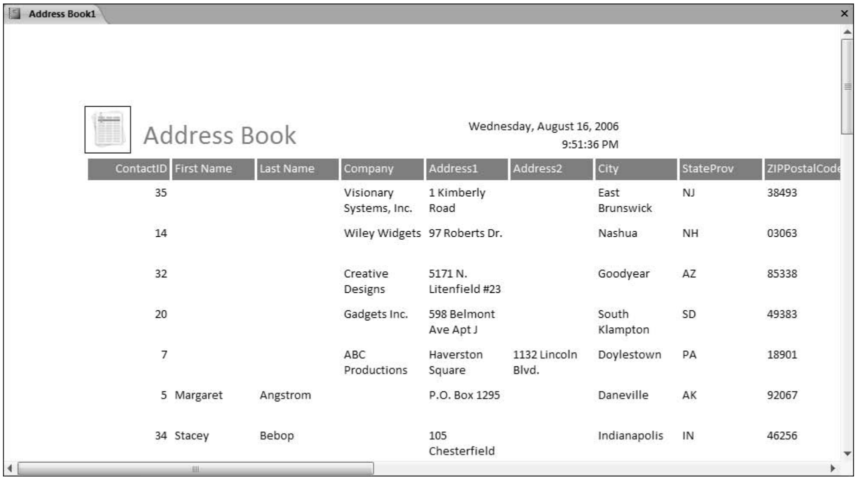
Products

Wednesday, August 16, 2006
9:50:51 PM

ProductID	Our Product ID	Product Name	Product Photo	Selling Price	Taxable	Pounds
10	RF-3322	Lucky Rabbits Foot		$7.99	☐	0
7	SC001	Scanner cable		$9.98	☑	0
4	BMP3-01	Budget MP3 Player		$10.00	☑	1
9	IW-2322	Magic Inkwell		$14.99	☑	1
14	BSW-3232	Big Subwoofer		$29.99	☑	3
6	FF-232	Lawn Flamingo		$29.99	☑	2
15	50ACD-121	50pk Audio CD-R		$39.99	☑	1
11	50FDPK	50-pk Floppy Disks		$39.99	☑	1
12	WCS3432	WayCool Scanner		$89.99	☑	12
2	GW-123	Golden Whistle		$100.00	☑	0
8	TBD001	Microwave Blow Dryer		$129.99	☑	1

Figure 1-9: The columnar report lists field names and values.

The Simple Report Tool does a pretty nice job of formatting your tabular report. Still, if you don't like the results, you can use Design view to get rid of the unwanted fields, widen the controls for the fields and field names you want to keep, or switch to landscape printing (or all three).



Address Book

Wednesday, August 16, 2006
9:51:36 PM

ContactID	First Name	Last Name	Company	Address1	Address2	City	StateProv	ZIPPostalCode
35			Visionary Systems, Inc.	1 Kimberly Road		East Brunswick	NJ	38493
14			Wiley Widgets	97 Roberts Dr.		Nashua	NH	03063
32			Creative Designs	5171 N. Litenfield #23		Goodyear	AZ	85338
20			Gadgets Inc.	598 Belmont Ave Apt J		South Klampton	SD	49383
7			ABC Productions	Haverston Square	1132 Lincoln Blvd.	Doylestown	PA	18901
5	Margaret	Angstrom		P.O. Box 1295		Daneville	AK	92067
34	Stacey	Bebop		105 Chesterfield		Indianapolis	IN	46256

Figure 1-10: The tabular report looks like a datasheet.

Editing Reports in Design View

Book IV, Chapter 1 describes how to edit forms in Design view; most of that same information holds true for editing reports. Figure 1-11 shows a report in Design view (specifically, a report created by the Simple Report Tool).

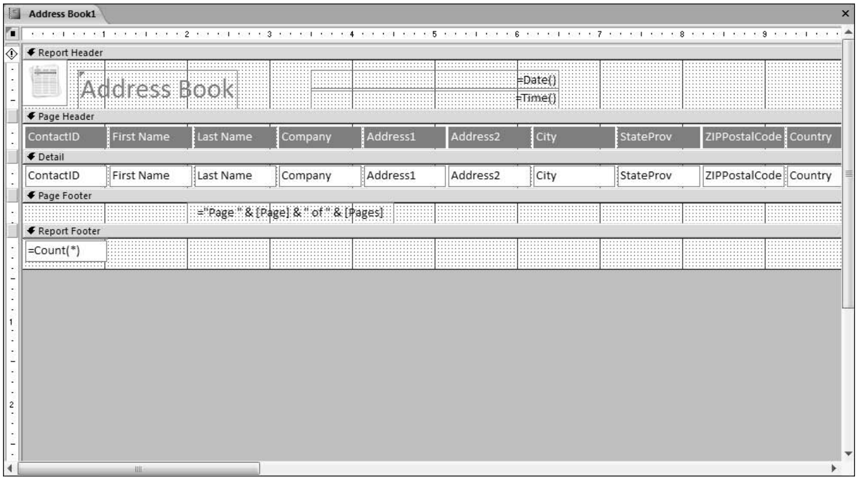


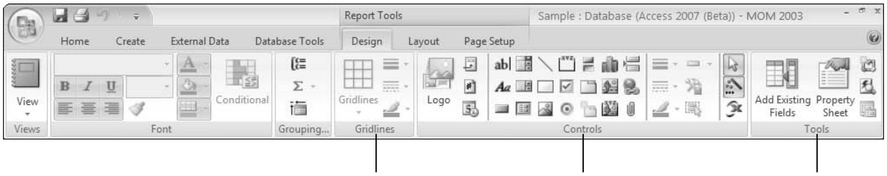
Figure 1-11: A report in Design view.

You can modify your report in many ways, some of which work just as they do when modifying a form. Check out the following list for some of the ways — and for the chapter in Book IV that describes each one:

- **Creating, editing, moving, and deleting controls:** Controls are the boxes on the Design grid that display labels, data from fields, and other information. See Book IV, Chapter 2 for the lowdown.
- **Drawing lines and boxes:** Book IV, Chapter 2 has a section devoted to this.
- **Setting report properties:** See Book IV, Chapter 1 for details.
- **Saving, importing, copying, and renaming reports:** See Book IV, Chapter 1 for details.

When you are in Design view, the Access Ribbon looks like Figure 1-12, with most of the same buttons that are used when designing a form.

However, some things work differently for forms and reports. Reports don’t have command buttons and drop-down lists (they wouldn’t work on paper!). Reports also have to fit correctly on the printed page and need page headers, footers, and headings for subsections. The rest of this chapter describes report-specific features, and the next chapter describes controlling how reports print.



Gridlines group
Controls group
Tools group

Figure 1-12: The Access Ribbon in Design view.

Report Sections and How They Work

In Design view, your report is broken into parts called *sections*. The main part of the report is the *Detail section* — which shows information from fields in the table or query that is the record source for the report. The other sections come in pairs around the Detail section.

Sections provide headers and footers for your pages and allow you to group data using a particular field. If you have a number of reports with the same value in a field, you can display those records together in the report. For example, if your record source has a Date/Time field, you can create a section for that field and group records that have the same date, with subtotals by date. Table 1-2 lists the different sections that a report can include, with tips for how to use the section.

Table 1-2 Sections of Reports

Report Section	*Where It Appears and How to Use It*
Report Header and Footer	Appears at the beginning and end of the report. These sections are for summary information about the entire report. The Report Header can include a title page. The Report Footer can include totals for all the records in the report.
Page Header and Footer	Appears at the top and bottom of each page, and usually includes the report name, the date, and the page number.
Section Header and Footer	Appears at the top and bottom of each grouping (before the first record and after the last record) in a group that has the same value for a specific field. Your report may have more than one Section Header and Footer: You get one pair for each grouping. The Section Footer may include subtotals. Format Section Headers and Footers to make the hierarchy of the report obvious (for instance, larger fonts for first-level groups and smaller fonts for second-level groups).
Detail	Appears after each Section Header or after the Report Header if your report has no additional sections. Displays values for each record and can contain calculated fields.

In Design view, each section has a specific place. The gray bar names the section, and the controls appearing underneath the bar appear every time that section of the report prints. In the report shown in Figure 1-13, the Report Header prints only once, at the very beginning of the report. The Page Header section is blank, so nothing prints at the top of each page. Records are grouped by company name, with the company name and address printing at the beginning of the section for each company (in the Company Header). The Detail section prints information about each product, with the products for each company appearing under its Company Header. The Company Footer section is blank (a little space is left before the next company). The Page Footer section includes the current date and time, the page number, and the total number of pages in the report. The Report Footer section is blank. Figure 1-14 shows the report when printed.

Most sections are repeated many times in the report when you print it. For example, the Company Header in Figure 1-13 prints once for each company that has products. The Detail section prints once for each product. The Page Header and Page Footer sections print once (each) per page.

When you create a report using a Report Wizard, you get sections for each field on which you grouped the records. When you create a report from scratch in Design view, Access gives you just the Page Header, Detail, and Page Footer sections. You can add or delete sections in Design view, as described in the next two sections of this chapter. You can also adjust the size of each section by dragging the section dividers upward and downward.

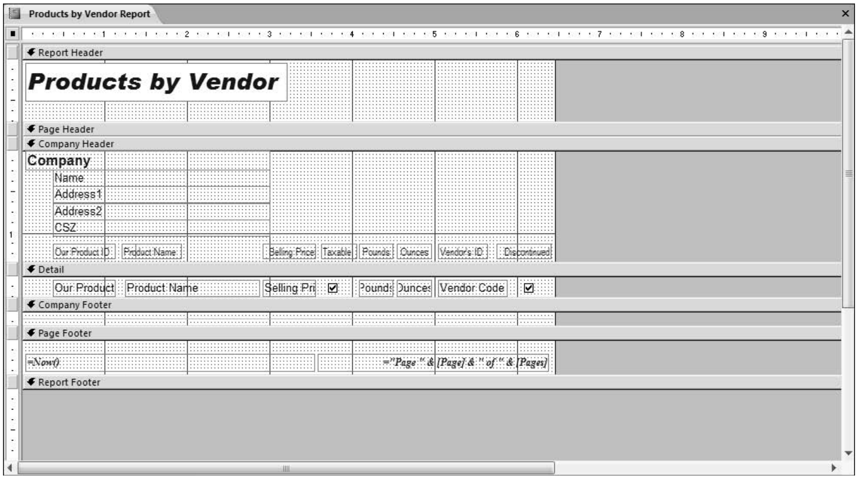
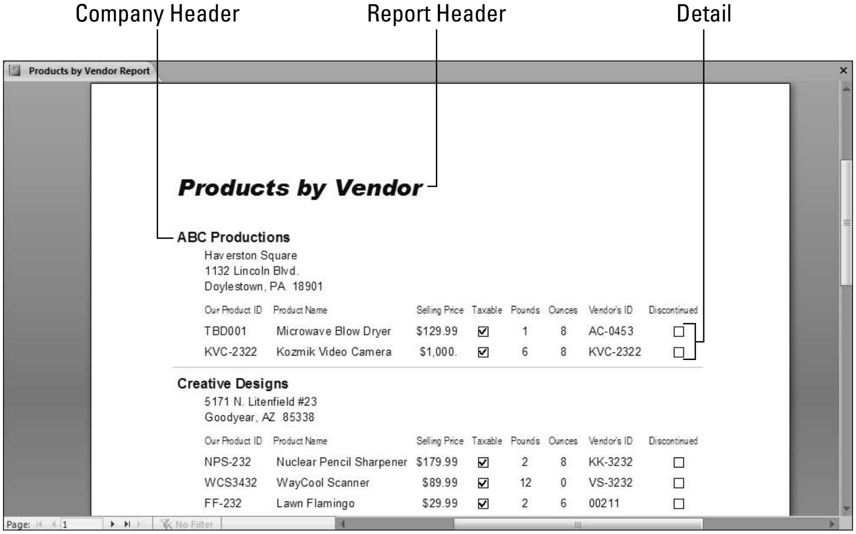


Figure 1-13: Report sections determine what prints at the beginning and end of the report, in each section of the report, and at the top and bottom of the page.

TIP

You can't delete the Detail section. You can leave it blank, though, if you want a summary report with subtotals and totals but no data for individual records. Drag its lower edge (the top of the next section divider) upward to shrink the section to nothing. (In Figure 1-13, the Page Header section is shrunk to nothing.)



Products by Vendor

ABC Productions

Hav erston Square
1132 Lincoln Blvd.
Doylestown, PA 18901

Our Product ID	Product Name	Selling Price	Taxable	Pounds	Ounces	Vendor's ID	Discontinued
TBD001	Microwave Blow Dryer	$129.99	☑	1	8	AC-0453	□
KVC-2322	Kozmik Video Camera	$1,000.	☑	6	8	KVC-2322	□

Creative Designs

5171 N. Litenfield #23
Goodyear, AZ 85338

Our Product ID	Product Name	Selling Price	Taxable	Pounds	Ounces	Vendor's ID	Discontinued
NPS-232	Nuclear Pencil Sharpener	$179.99	☑	2	8	KK-3232	□
WCS3432	WayCool Scanner	$89.99	☑	12	0	VS-3232	□
FF-232	Lawn Flamingo	$29.99	☑	2	6	00211	□

Figure 1-14: The printed report includes product information grouped by company (vendor).

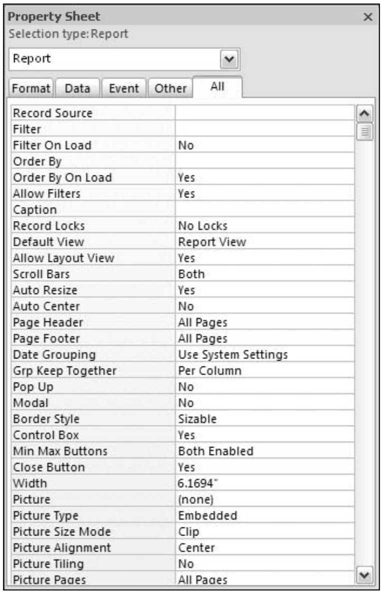
Setting report and section properties

As with most Access objects, each section and control in your report — as well as the entire report itself — has properties. You can display and change the properties on the Property sheet (see Figure 1-15). To display the Property sheet for the whole report, double-click the report selector (the gray box in the top-left corner of the Design View window) or right-click the ruler at the top of the Design View window and choose Properties from the context menu. Click the tabs to see the different categories of properties (or click the All tab to see all of them). Click in a property to change it.

To see or change the properties of a particular section, double-click the section header or select the section header and click the Property Sheet button on the Tools chunk of the Design tab of the Ribbon. After the Property sheet is visible, you can click a section header or control to see its properties.

TIP

You can quickly display or hide the Property sheet by pressing Alt + Enter.



Record Source	
Filter	
Filter On Load	No
Order By	
Order By On Load	Yes
Allow Filters	Yes
Caption	
Record Locks	No Locks
Default View	Report View
Allow Layout View	Yes
Scroll Bars	Both
Auto Resize	Yes
Auto Center	No
Page Header	All Pages
Page Footer	All Pages
Date Grouping	Use System Settings
Grp Keep Together	Per Column
Pop Up	No
Modal	No
Border Style	Sizable
Control Box	Yes
Min Max Buttons	Both Enabled
Close Button	Yes
Width	6.1694"
Picture	(none)
Picture Type	Embedded
Picture Size Mode	Clip
Picture Alignment	Center
Picture Tiling	No
Picture Pages	All Pages

Figure 1-15: You can set the properties of the entire report or of individual sections or controls.

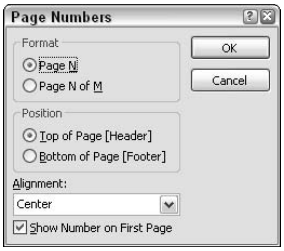
Adding page headers, footers, and numbers

To add Report or Page Header or Footer sections, click the Report Header/Footer button on the Show/Hide group of the Arrange tab on the Ribbon. You can also right-click anywhere in the Report Design window and select Report Header/Footer from the context menu. Access adds these in pairs: If you have a Page Header, you have a Page Footer. You can leave one or the other blank, though. To delete the Page or Report Header or Footer sections, choose the same command again: Access deletes the Header/Footer pair and all the controls in the sections.

If you want just a header or just a footer, change the height of the section you want to hide by dragging the bottom border of the section up to the top border.

Adding page numbers

After you have a Page Header or Footer to put controls in, you can create controls in those sections, or drag them there from other sections. The easiest way to add page numbers — probably one of the most common controls you find in a report — is to click the Insert Page Numbers button on the Controls group of the Design tab on the Ribbon. When you see the Page Numbers dialog box (shown in Figure 1-16), choose the format of the numbering, the position, and the alignment (Left, Center, Right, Inside, or Outside). Inside and Outside page numbering refers to alternating left and right positions on odd and even pages. You can also omit the page number on the first page by deselecting the Show Number on First Page check box.



Page Numbers

Format
● Page N
○ Page N of M

Position
● Top of Page [Header]
○ Bottom of Page [Footer]

Alignment: Center

☑ Show Number on First Page

Figure 1-16: Adding page numbers to your report.

If you'd rather make your own page-numbering controls, you can create your own text box control by following these steps:

1. **With the report open in Design view, display the Design tab on the Ribbon.**

2. **Create a text box control in the Page Header or Footer section by clicking the Text Box button on the Controls group of the Design tab on the Ribbon, and clicking in the header or footer section.**

   Text Box

   Don't worry if the text box doesn't appear in exactly the right place — you can drag it there later.

3. **If Access created a label to go with the text box, delete the label by clicking in the label and then pressing the Delete key.**

   Your page number doesn't need a label.

4. **Display the Property sheet if it's not already on-screen by clicking the Property Sheet button on the Tools group of the Design tab on the Ribbon.**

   Property Sheet

   You see the Property sheet with the properties of the text box you just created.

5. **Click the Data tab on the Property sheet, click in the `Control Source` property, and type the following expression:**

   ```
   = Page
   ```

   To display the word `Page` as well as the number, type

   ```
   = "Page " & Page
   ```

Adding the date and time

If you want to include the current date or time on your report, follow the same steps as in the preceding section, but type the following expression into the `Control Source` property of another text box:

```
= Now()
```

The `Now()` function returns both the date and time (for example, `6/25/04 1:55:48 PM`). If you want to print only the current date, format the box as a date using the `Format` property. (In the Property sheet for the text box, click the Format tab and set the `Format` property to one of the date formats, which omit the time.)

Controlling which pages get page headers and footers

You can also choose whether the Page Header and Footer sections print on all pages, all but the Report Header page (so your cover page isn't numbered), all but the Report Footer page, or all but the Report Header and Footer pages. The following steps explain how to change the Page Header and Footer sections properties:

1. **With the report open in Design view, double-click the report selector (the gray box in the top-left corner of the Design window, where the rulers intersect) or right-click the title bar of the Design View window and choose the Properties option.**

   You see the Property sheet for the report (refer to Figure 1-15).

2. **Click the Format tab.**

3. **Set the** `Page Header` **and** `Page Footer` **properties.**

   Your options are `All Pages`, `Not With Rpt Hdr`, `Not With Rpt Ftr`, and `Not With Rpt Hdr/Ftr`.

TIP

Displaying the first value of a field in the Page Header section to make a telephone-book-style header is easy. Just create a text box in the Page Header section that displays the field. When you print the report, the text box shows the value for the first record on the page. You can also print the value of the last record on the page in the Page Footer section.

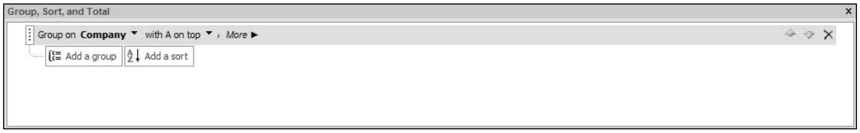
Adding sections that group your records

To create *grouping sections* (also known as *group sections*), you tell Access to group the records in your report by the value of one or more fields. For each field, you get a header and footer section for that field. For example, on a report that lists products, you may want to group the records by category, and within category by vendor. If you choose to add both a header and footer section for the group, you end up with Category Header, Vendor Header, Vendor Footer, and Category Footer sections (in that order).

To create new grouping sections, display the report in Design view and follow these steps:

1. **With the report open in Design view, click the Group & Sort button in the Grouping and Totals group of the Design tab on the Ribbon.**

Access displays the Group, Sort, and Total pane, as shown in Figure 1-17. You see any fields that are currently used for sorting or grouping the records on your report. If more than one field appears, the topmost field is the major grouping and other fields are subgroups.



Group on **Company** ▼ with A on top ▼ , *More* ▶

Figure 1-17: The Sorting and Grouping dialog box defines how the records in your report are grouped for subtotals.

2. **Click the Add a Group button and select a field from the Field/Expression drop-down list to add a section (grouping).**

   You see a list of the fields in the record source for your report. After you select a field, Access automatically uses an ascending sort (with A at the top) for the new field.

3. **To sort this field in descending order, click the down arrow next to "with A on top" and select "with Z on top."**

   Click the More button in the Group, Sort, and Total pane to show the properties for the selected grouping. The default settings for a new grouping have a header section, do not have a footer section, and don't keep all records in each group together on a page.

4. **You can choose to hide or display headers and footers for the group by using the drop-down arrows next to the appropriate settings. As soon as you choose to hide or display a group footer or header, Access reflects your changes in the Design view.**

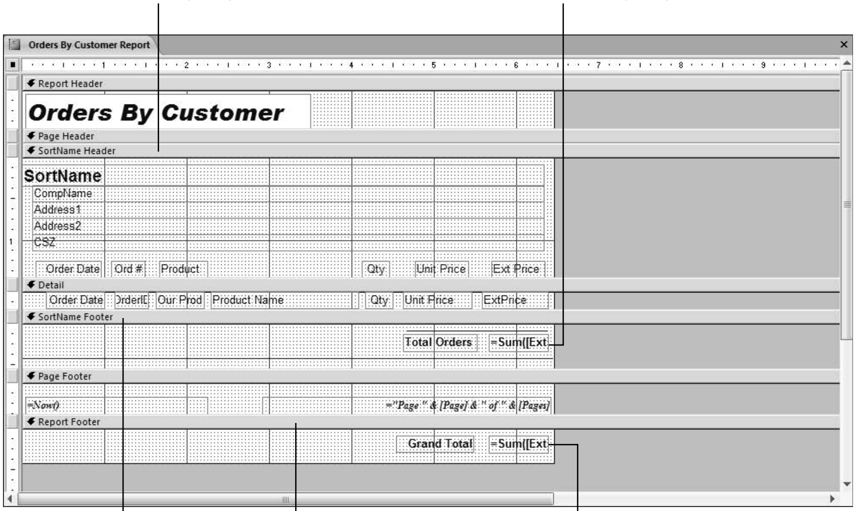
   Use the `Group Header` or `Group Footer` property if you want to print something before the first record or after the last record in the group.

5. **Close the Sorting and Grouping dialog box by clicking its X button.**

   Access makes a new grouping with a header and/or footer, as shown in Figure 1-18. You can also use the Group, Sort, and Total pane to delete groupings, and you can set the group properties shown in Table 1-3 by changing the properties in the Group, Sort, and Total pane.

Prints before each group of records

Subtotal for each group



Prints at the end of the report

Total for entire report

Prints after each group of records

Figure 1-18: You can add header and footer sections that print information at the beginning and end of each group of records.

Table 1-3	Properties of Report Groups
Group Property	***What It Does***
`Group on`	Specifies the field on which the group is based
`with A on top`	Specifies whether the group will be sorted in ascending or descending order
`by entire value`	Specifies whether you want the group to be sorted by the entire field value, the first character, or the first two characters
`with totals`	Specifies whether you want to include totals and how they should be displayed
`with a header section`	Specifies whether you want to include a Group Header
`with a footer section`	Specifies whether you want to include a Group Footer
`Do not keep together on one page`	Specifies whether you want to keep the header and first record together on a page, keep the whole group together on a page, or don't care
`with title`	Lets you choose a title for your group

TIP

You have some control over whether your groups start on a new page, or can be broken and printed on several pages. If you want to start a new page each time a new group starts, change the `Force New Page` property to the `Before Section` setting on the Format tab of the Property sheet for the group header section. You can also set the `Keep Together` property for the group header: The `Yes` setting keeps the entire group together on one page, and the `No` setting allows Access to break a group over multiple pages.

Sorting the records in your report

You can sort a report by sorting the record source — the table or query that provides the records for the report — before you print. But a more foolproof method is to use the Group, Sort, and Total pane to make a group for the field(s) by which you want to sort, even if you don't want to print anything extra when the field value changes. When you tell Access to group by a field, you get sorting thrown in for free. Selecting without a header section and without a footer section in the Group, Sort, and Total pane tells Access to sort by the field — but not to print any grouping sections.

To sort the records in a report by two fields, decide which field is the primary sort field and which is the secondary one. The secondary sort field works like a tiebreaker, used only when two or more records have the same value for the primary sort field. For example, to sort order records by customer name, you usually sort by last name (primary sort field) and first name (secondary sort field).

When you add a group to your report, Access automatically sorts the group in ascending order (you can change this to descending order) based on the field on which you grouped the report. If you have a large number of records, you may want additional sort fields (for example, you could sort a mailing list by ZIP code, then last name, and then first name).

TIP

You can sort by a calculated value that is not one of the fields in the record source of the report. Just enter an expression in the Field/Expression column of the Sorting and Grouping dialog box. See Book III, Chapter 2 for an introduction to expressions. For example, if you print a listing of products, you may want to sort them by profit margin — by `[Selling Price] –[Purchase Price]`. You can type that expression into the Field/Expression column (hence the name of the column!).

Calculating group subtotals and report totals

If you use the Report Wizard to create a report, and you use the Summary Options button to request sums, averages, minimum values, or maximum values for each group, you already have subtotals and totals on your report. But you can make them yourself in Design view, too.

After you group your report on one or more fields, you can add subtotals. In the group footer section, create a text box control for each sum, count, or other summary information that you want to print. To print totals and counts for the entire report, make a text box in the Report Header or Report Footer section. Then type an expression in the `Control Source` property for the text box, using aggregate functions such as `Sum()`, `Avg()`, and `Count()`. (See Book IV, Chapter 4 for the scoop.)

When you use aggregate functions in a group header or footer section, Access automatically restricts the records to those in the current group. For example, the `Sum()` function totals the values of a field for all the records in the group. To subtotal the amount paid for each product in the current group, you use the following expression in a text-box control:

```
= Sum([Price])
```

To print the number of records in the report, type the following expression in the `Control Source` property (located on the Data tab of the Property sheet) for a text box in the Report Header or Report Footer section:

```
= Count(*)
```

Don't use aggregate functions in the Page Header or Page Footer sections of a report; you get an `#Error` message.

Figure 1-18 (earlier in this chapter) shows a report in Design view with `Sum()` functions in both the SortName Footer and Report Footer sections. The `Sum()` function in the SortName Footer section prints a subtotal of the shipping charges for each month's orders, and the `Sum()` function in the Report Footer section prints the total shipping charges for the whole report.

Formatting Tips and Tricks

The following list details a few tricks for making nicely formatted controls for your reports. Most of them involve setting report, section, or control properties on the Property sheet:

- **Printing calculations:** Print a *calculated field* — a field decided by an expression — the same way you display one on a form: Create a text box and enter an expression in the `Control Source` property. Be sure to set the control's `Format` property, too. (Book IV, Chapter 4 has the excruciating details of displaying calculations on forms; the same methods work for reports.)

- **Prompting for information to print:** Just as Access can prompt for information when running a query (as described in Book III, Chapter 2), you can use parameters when printing a report. Parameters allow you to specify information — usually in the Report or Page Header or Footer sections — that you want to print. Create a text box control where you want the information to print. For the `Control Source` property of the text box, enter the parameter prompt in square brackets, so it looks something like the following:

  ```
  [Enter title line]
  ```

- **Avoiding space between fields:** When you display several fields in a row, you may not want to leave gaps between them. For example, in a mailing label or form letter, you may want to print fields containing first names and last names with only one space between them. To eliminate extra space between fields, regardless of the length of the values in the fields, *concatenate* them (glue them together) using the `&` operator. (We describe calculated fields and the `&` operator in Book III, Chapter 2.) Create a textbox control and type an expression in its `Control Source` property, such as the following expression:

  ```
  = [First Name] & " " & [Last Name]
  ```

  This expression glues the first name, a space, and the last name together. If the first name were `Elvis` and the last name were `Presley`, you end up with `Elvis Presley` (the name, anyway).

- **Using conditional calculations:** You can print one thing in some circumstances and another thing in others by using the `iif()` function. (For more on the `iif()` function, see Book IV, Chapter 4.) For example, you may make a report that can print either an invoice or a receipt, depending on whether the customer has paid. At the top, you include a text box with an expression in the `Control Source` property that spells out that Access should print either an invoice or a receipt, depending on the value of the `Paid` field. That expression looks something like the following:

  ```
  = iif([Paid], "Receipt", "Invoice")
  ```

- **Calculating a running sum:** You can tell Access to sum the values of a numeric field, showing the total of the current record (a *running sum*). Set the `Running Sum` property of the textbox control displaying that field to `Yes`. You may want to include two text box controls for the numeric field: one to show the value for the current record (with the `Running Sum` property set to `No`), and one to show the running sum (with the `Running Sum` property set to `Yes`).

- **Hiding duplicate values:** If a group of records have the same value for a control, and you want the value to print only the first time it appears, you can set the `Hide Duplicates` property of the field to the `Yes` setting. This setting is especially useful in tabular reports, in which each field appears in a separate column.

Don't use a field name as the control name for a calculated control. When you create controls, Access names them automatically, although you can change the names later. If you rename a calculated control, make sure that the name you assign isn't the same as any field mentioned in the expression (or any field in the record source of the report). Access gets confused about whether references to that name are to the field or to the control and the report displays the `#Error` message.

Copying Forms to Reports

If you have a form that you want to print, you can certainly print it as is, but you have a lot more control over the format if you turn the form into a report first. You can then change the design for the report to print nicely without changing the format of the original form.

To save a form as a report, select the form in the Navigation Pane, click the Office Button, and choose Save As from the menu. When you see the Save As dialog box, type a name for the new report and set the drop-down list to the Report option. Access creates a new report based on the design of the form.

Most forms have gray backgrounds. After saving a form as a report, be sure to change the background of your new report to white before printing the report. Otherwise, you waste a lot of ink (or toner). Just right-click the background of each section, choose the Fill/Back Color option from the shortcut menu that appears, and choose the white box in the palette of colors.

Adding and Formatting Subreports

A *subreport* provides detail information from other tables. For example, if you have a report about customers, a subreport can list the orders for each customer. Figure 1-19 shows a report with two subreports in Design view, and Figure 1-20 shows the same report in Print Preview.

You can create a *subreport control* to print another report as part of your report. An *unbound subreport* is not connected to the records in the main report: No relationship exists between the record source of the main report and the subreport. The unbound subreport in Figure 1-19 displays information from the My Business table, which contains one record, with the business's name, address, and other information. (We like to create a My Business table to store this information in one place, for use in all the forms and reports in the database. If your phone number changes, for example, you change it in the My Business table, and all your forms and reports are updated automatically.)

Unbound subreport

Bound subreport

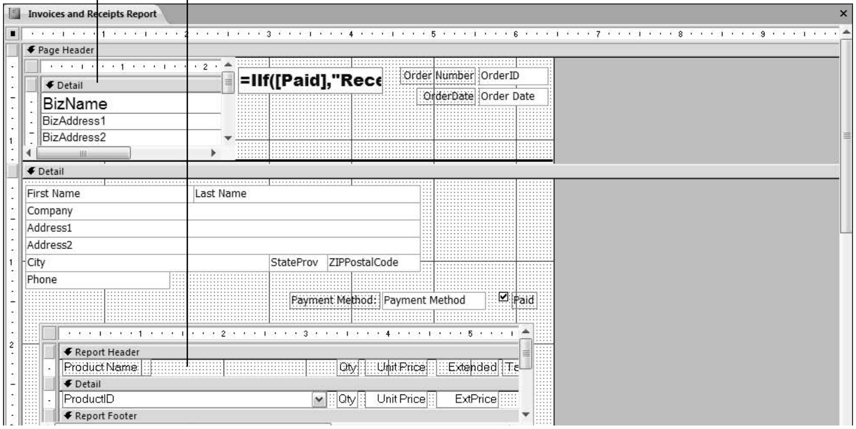
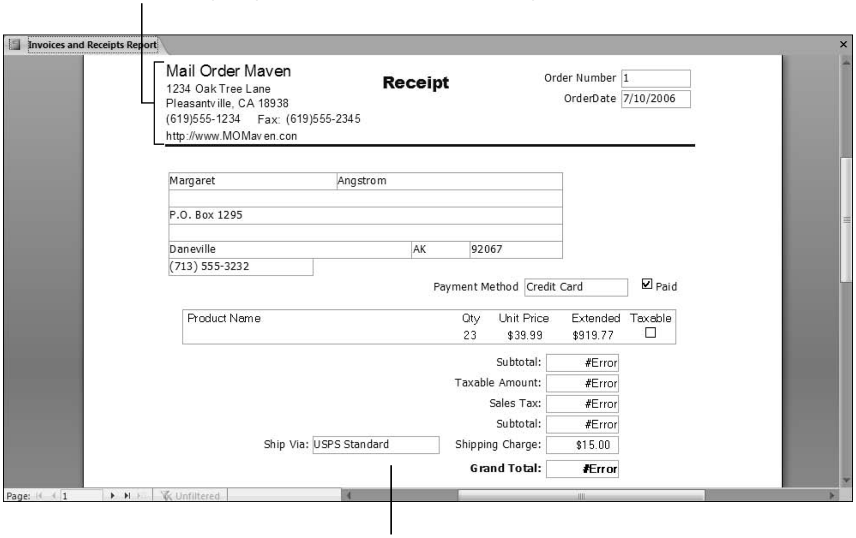


Figure 1-19: A subreport can be bound or unbound to the main report.

With an unbound subreport, Access prints the same information for each record in the main report. In Figures 1-19 and 1-20, the business information from the My Business table is printed at the top of each invoice.

Unbound subreport prints the same data for every record



Mail Order Maven
1234 Oak Tree Lane
Pleasantville, CA 18938
(619)555-1234 Fax: (619)555-2345
http://www.MOMaven.con

Receipt

Order Number: 1
OrderDate: 7/10/2006

Margaret Angstrom
P.O. Box 1295
Daneville AK 92067
(713) 555-3232

Payment Method: Credit Card ☑ Paid

Product Name	Qty	Unit Price	Extended	Taxable
	23	$39.99	$919.77	□

Subtotal: #Error
Taxable Amount: #Error
Sales Tax: #Error
Subtotal: #Error
Ship Via: USPS Standard
Shipping Charge: $15.00
Grand Total: #Error

Bound subreport prints data that relates to the current record

Figure 1-20: An unbound report prints the same thing for all records. A bound report prints records from a related table.

A *bound subreport* provides detail from other tables. In Figures 1-19 and 1-20, the bound subreport lists the items in the current order, pulling the information from the Order Details table. Bound subreports help you print information from a one-to-many relationship: The main report displays records from the master (*one*) table and the subreport displays records from the detail (*many*) table.

If you always print two or more reports at the same time, include them as unbound subreports in a new, unbound report. When you print the new report, Access prints each of the subreports. Just make sure that all the reports require the same kind of paper!

Making a subreport

To create a subreport, whether bound or unbound, follow these steps:

1. **Create the report you plan to use as a subreport and save it.**

   For example, to make the report in Figures 1-19 and 1-20, you make one report appear as the unbound subreport, with the My Business table as its record source. You create another report as the bound subreport, with the Order Details table as its record source. When you preview the report by itself, Access displays all the records in the record source — but when a report serves as a subreport, Access restricts the records whenever the subreport prints, printing out only the records that match the current record in the main report.

   When you create this report, nothing about it says "subreport" — but any report can be used as a subreport. We like to use the word "subreport" in the names of reports that never print on their own; they only exist as subreports of other reports.

2. **Open the main report in Design view.**

3. **Make space for the subreport control (also called a Subreport/ Subform control) in the Detail section of the report.**

   Drag your other controls out of the way.

4. **In the Navigation Pane, scroll down to the Reports section.**

   This gets you ready to drag the subreport from the Database window to the Design View window.

5. **Select the subreport-to-be from the Reports list in the Navigation Pane and drag it into the Design View window, dropping it where you want the subreport to appear.**

   Access creates a subreport control on the main report, containing the report you selected. The `Source Object` property for the subreport control contains the name of the report that you dragged.

6. **Delete the label that Access created for the subreport if you don't like it.**

   Access creates a label for the subreport with the name of the report, but you can select it and delete it if you want.

7. **Move and size the subreport control.**

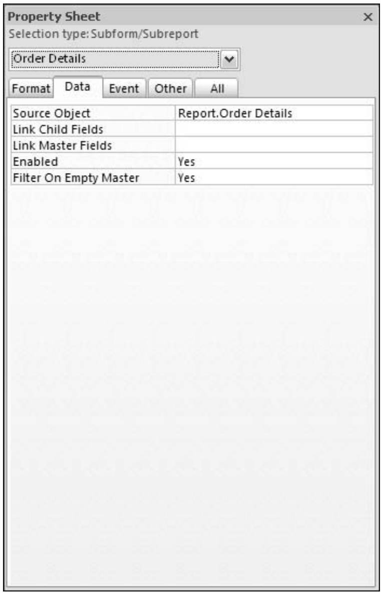
   Drag the control to the location you want and drag its edges to adjust its size.

8. **Click in the subreport control and then click the Property Sheet button on the Tools group of the Design tab on the Ribbon to display the Property sheet for the subreport control.**

   Figure 1-21 shows the Property sheet for a subreport control with the Data tab selected. (While you've got the Property sheet displayed, you can adjust the format properties, too.)

9. **Check the** `Link Child Fields` **and** `Link Master Fields` **properties on the Data tab of the Property sheet.**

   These properties contain the names of the fields that relate the main and subreports. The `Link Master Fields` property should contain the name of the field in the record source of the main report that relates to a field in the subreport. The `Link Child Fields` property contains the name of the matching field in the record source of the subreport.



Property Sheet

Selection type: Subform/Subreport

Order Details

Source Object	Report.Order Details
Link Child Fields	
Link Master Fields	
Enabled	Yes
Filter On Empty Master	Yes

Figure 1-21: The properties of a subreport control include the link between records in the subreport and those in the main report.

Printing information from a subreport on the main report

Just as you can display totals from a subform on a main form, you can print totals from a subreport on the main report. (See Book IV, Chapter 4 for how to create a control on the main report to display a total from a subreport.)

When entering the expression in the textbox control on the main report, use this format:

```
= [subreport control name].Report![total control]
```

Replace `subreport control name` with the name of the subreport control. Replace `total control` with the name of the text box control in the subreport that displays the total. For example, the following expression may display the total extended price (price times quantity) for the records in the report that display in the `Order Detail Subreport` subreport control:

```
= [Order Detail Subreport].Report![Total Ext Price]
```

Displaying Empty or Long Fields

Text and Memo fields can pose problems on reports, because they can contain one or hundreds of characters. Anticipating how much space to leave for them is hard. Luckily, Access has some features to help deal with long fields.

Displaying long text

If a Text or Memo field in your report contains more than a few words, you may want the field to wrap onto additional lines. For example, the `Description` field in a Products table may contain a whole paragraph about the product. You could display the field in a very large text box control that can fit the largest description in the table, but Access would leave a large empty space in the report after short descriptions. Instead, each text box can expand or shrink vertically to fit the amount of text in the field for each record.

To make a text box grow, start off by making it big enough to fit just one line of text. (See Book IV, Chapter 2 for how to make a textbox control.) Display its Property sheet by clicking the Property Sheet button on the Tools group of the Design tab on the Ribbon. Then set its `Can Grow` property (which is on the Format tab) to `Yes`. When Access prints each record, the textbox control expands until the entire value of the field fits. The remaining controls move down the page.

When you set a control's `Can Grow` property to `Yes`, Access sets the `Can Grow` property for the section that contains the property, too. When Access prints the report, the section expands as well as the control, so nothing gets cut off. If you don't want the section to expand, you can change its `Can Grow` property back to `No` to omit information that doesn't fit in the section. Set the `Can Grow` property to `No` when printing on forms of a predetermined size, such as mailing labels. (Later in this chapter, we show you how to set up a report that prints mailing labels.)

Displaying Fields That May Be Empty

To avoid leaving blank lines when a field is blank, set the `Can Shrink` property for the text box to `Yes`. (This setting is on the Format tab of the Property sheet.) For example, many address lists are stored in tables that have two lines for the street address. If the second line is empty, the mailing label looks better if the city/state/zip line prints right below the first address line with no gap.

To make a textbox control that shrinks when the value is blank, make the text box big enough to fit the longest value in the table. Then set its `Can Shrink` property to `Yes`. When printing the report, Access omits the control if the field value is blank.

When you set the `Can Shrink` property of a control to the `Yes` setting, Access does not automatically change the `Can Shrink` property of the section that contains the control. Leave the `Can Shrink` properties of the Detail section set to the `No` setting if the Detail section must always be the same size — as with mailing labels or other pre-printed forms. Otherwise, set these properties to `Yes`.

Creating Mailing Labels

A perennial database task is printing mailing labels from lists of names and addresses. The easiest way to create a report that prints on labels is to use the Label Wizard, which contains a long list of preset formats for all standard Avery brand and compatible labels. (Most boxes of label sheets include an Avery number that specifies the size of your labels.) After you create a report with the wizard, you can make further changes in Design view.

Running the Label Wizard

To run the Label Wizard, follow these steps:

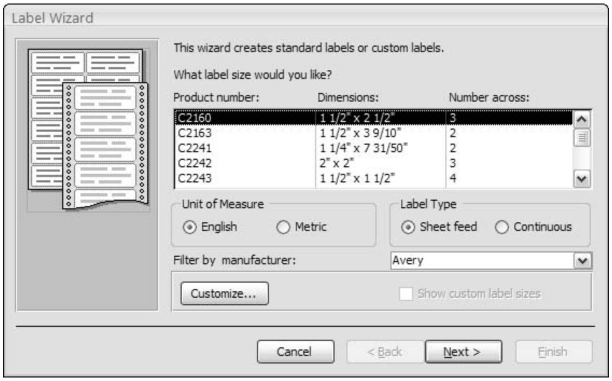
1. **In the Navigation Pane, specify what you want to print out:**

   a. Select the table or query that contains the information you want to print on your labels.

   b. Display the Create tab on the Ribbon.

2. **On the Ribbon, click the Labels button on the Reports group.**

   You see the Label Wizard, as shown in Figure 1-22.



Label Wizard

This wizard creates standard labels or custom labels.

What label size would you like?

Product number:	Dimensions:	Number across:
C2160	1 1/2" x 2 1/2"	3
C2163	1 1/2" x 3 9/10"	2
C2241	1 1/4" x 7 31/50"	2
C2242	2" x 2"	3
C2243	1 1/2" x 1 1/2"	4

Unit of Measure: ● English ○ Metric

Label Type: ● Sheet feed ○ Continuous

Filter by manufacturer: Avery

□ Show custom label sizes

Figure 1-22: The Label Wizard knows the sizes and shapes of most sheets of labels.

3. **Choose the type of label from the Product Number list. Click Next.**

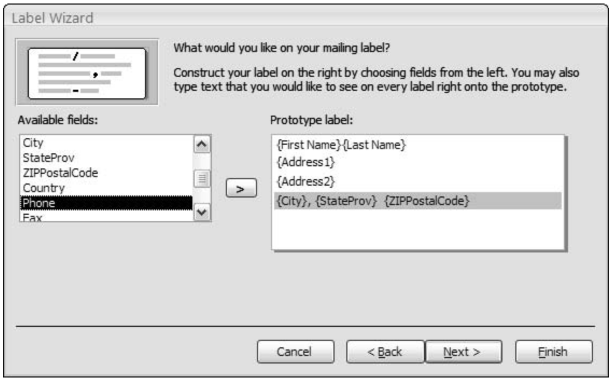
   Access normally shows the labels according to the numbers assigned by Avery, a major manufacturer of labels. But you can see other types of labels by changing the Filter by Manufacturer box:

   - If you plan to print continuous-feed labels (where the sheets are connected together) rather than sheets of labels, change the Label Type setting.
   - If you are printing on custom-printed labels, click the Customize button, click the New button in the New Label Size dialog box that appears, and tell Access about your labels.

4. **Choose the font, font size, weight (light, normal, or bold, among others), and color. Click Next.**

   Access uses these settings for the text boxes in the report.

5. **Choose the fields that you want to include on the label, as shown in Figure 1-23. Click Next.**



Label Wizard

What would you like on your mailing label?

Construct your label on the right by choosing fields from the left. You may also type text that you would like to see on every label right onto the prototype.

Available fields:

Prototype label:

{First Name}{Last Name}
{Address1}
{Address2}
{City}, {StateProv} {ZIPPostalCode}

Figure 1-23: You tell the Label Wizard what fields you want on your label and the wizard creates the textbox controls.

The Prototype Label box shows the layout of fields on the label, including spaces, punctuation, and text that prints on every label (for example, `"First Class"` or your return address). You arrange the fields and other information in the Prototype Label box. One line in the Prototype Label box is selected (it's gray), showing that new fields are added to this line. You can press the ↑ and ↓ keys to move to a different line.

To print a field on your mailing labels, click the field in the Available Fields box and then click the > button to add it to the current line of the Prototype Label box. (Double-clicking a field does the same thing.) To add text, such as a space, comma, other punctuation, or words, just move your cursor to the location in the Prototype Label box where you want the text to appear, and type it.

For example, the first line of a mailing label usually consists of the first name, a space, and the last name. With the first line of the Prototype Label box selected, you double-click the `First Name` field (whatever it's called in your table), type a space, and double-click the `Last Name` field. To move to the next line, press Enter or ↓.

If you put a field in the wrong place, click it in the Prototype Label box and press the Delete key to remove it.

Be sure to type a comma and a space between `city` and `State/Province` fields in the Prototype Label box, and a space between `State/Province` and `Zip/Postcode` fields, too.

6. **Choose the field(s) by which to sort the records. Click Next.**

   For example, to sort by last name within zip code, choose the `ZIP` field and then the `Last Name` field.

7. **Type a name for the report and click Finish.**

TIP

If the label report looks good in Print Preview, print it on a blank piece of paper before you start printing sheets of labels. Hold the printed sheet up to a blank sheet of labels and see whether the names and addresses line up with the labels. This method avoids wasting sheets of expensive labels while you refine your label report.

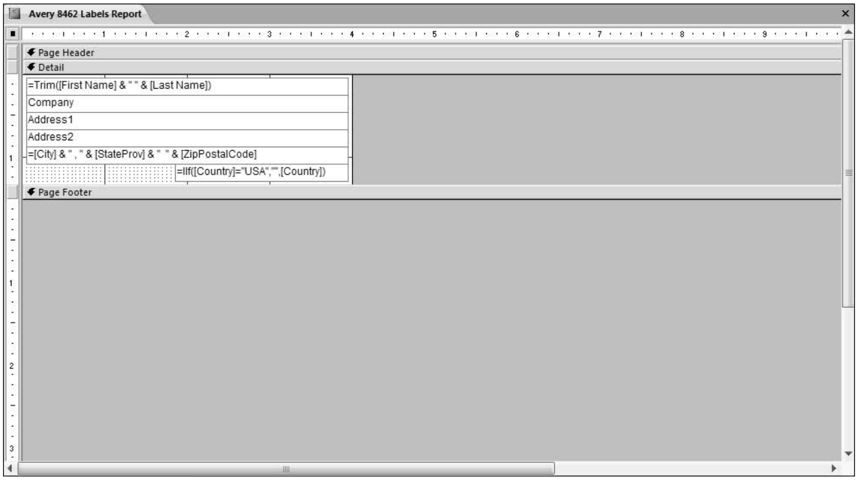
Behind the scenes in a mailing-label report

The Label Wizard makes a report that looks like Figure 1-24 in Design view. You see the fields and text that you told the wizard to include, followed by enough blank space to reach down to where the text should start on the next label. Where more than one field (or text) appears on a line, the Label Wizard has cleverly written expressions (starting with =) that use the `&` operator to *concatenate* (glue together) the information. In expressions, the wizard encloses each field name in square brackets `[ ]` because, for field names that contain spaces, these brackets prevent the spaces from confusing Access. The wizard also uses the `Trim()` function to eliminate any extra spaces at the ends of fields.

For example, the first line of the label in Figure 1-24 contains a text box with this expression as its `Control Source` property:

```
=Trim([First Name] & [Last Name])
```

This scary-looking expression glues the first name, a space, and the last name together — and then discards any spaces at the right end.



```
=Trim([First Name] & " " & [Last Name])
Company
Address1
Address2
=[City] & " , " & [StateProv] & "  " & [ZipPostalCode]
=IIf([Country]="USA","",[Country])
```

Figure 1-24: The Label Wizard creates a report the size of a single label.

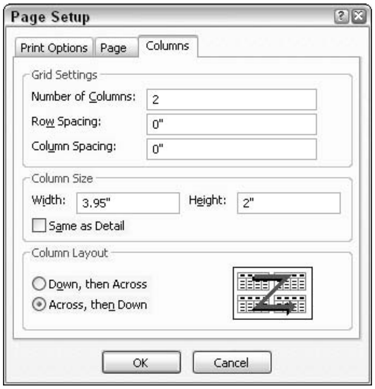
If you don't like the way information appears on your mailing labels, you can delete the text boxes, add new ones, alter the expressions in the existing text boxes, and change the formatting of the text boxes — the same kinds of changes you can make to the controls in any report.

Changing the page setup for labels

Unexpectedly, the report is only the size of a single label. You don't see a whole page full of labels. How does Access know how many labels to print across a row? The Page Setup dialog box for the report contains this information. If you specified the wrong Avery number in the Label Wizard (or if you have labels that don't have Avery numbers), you can change these settings.

With the report open in Design view, click the Columns button on the Page Layout group of the Page Setup tab on the Ribbon to display the Page Setup dialog box (as shown in Figure 1-25). You see the following settings:

- **Number of Columns:** How many columns of labels per page.
- **Row Spacing:** How much blank space to leave between one row of labels and the next (usually zero, because Access includes this space in the report design).
- **Column Spacing:** How much blank space to leave between one column and the next (that is, between one label and the next across each row).
- **Column Size Width and Height:** The size of the labels. If you leave the Same as Detail check box selected, Access sets these settings to be the same size as the Detail section of the report.
- **Column Layout:** The order in which the labels print on each page.



Grid Settings
Number of Columns: 2
Row Spacing: 0"
Column Spacing: 0"

Column Size
Width: 3.95" Height: 2"
□ Same as Detail

Column Layout
○ Down, then Across
● Across, then Down

Figure 1-25: The Columns tab of the Page Setup dialog box defines how your report prints on sheets of labels.

See the next chapter for how to print labels and other reports. The Page Layout group is also visible from the Print Preview screen.

TIP

You can use the settings on the Columns tab of the Page Setup dialog box to create newspaper-style “snaking” columns for any report, not just mailing labels. Make the Detail section of the report narrower than half the width of the paper, specify two columns, and set the `Column Layout` property to the `Down Then Across` setting.

Chapter 2: Printing Beautiful Reports

In This Chapter

- **Previewing your report on-screen**
- **Controlling report margins and page orientation**
- **Choosing which printer to print on**
- **Including Access reports in other Office documents**

After you create a good-looking report on-screen, the next step is to see whether it looks good on paper. To make it perfect (okay, close to perfect), you have to be able to control how the printer prints the report. This chapter describes page formats, margins, and other printer settings.

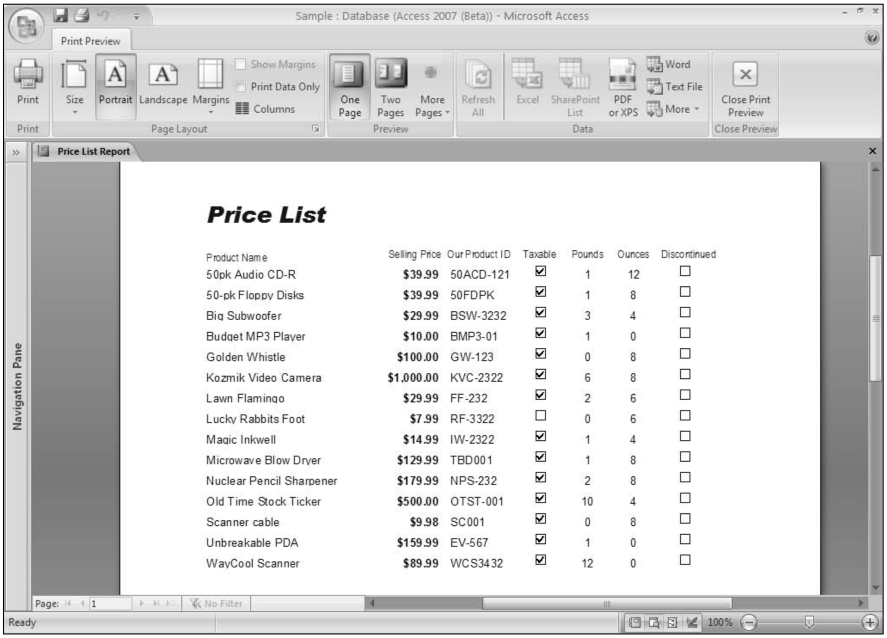
Viewing Your Report

You can see how the printed report will look *before* you spend the time, paper, and ink or toner to print it. Using Print Preview, you can see on-screen whether your controls are positioned as you want them, whether the right information appears in each control, and whether your headers and footers appear correctly. To see how your report looks in Print Preview, try the following:

- With the report open in Design view, click the Office Button and select Print ➪ Print Preview.
- If the report is not currently open, double-click the report name in the Navigation Pane.

The Print Preview window appears, showing you the top of the first page of your report, looking a lot like Figure 2-1. (Of course, the details of your own report will look different.)

You can display almost any Access object in Print Preview and then print it. When you're looking at a table in Datasheet view or a form in Form view, Print Preview is available on the Microsoft Office Button menu. Reports have more formatting options than any other type of object in Access, but sometimes datasheets and forms are worth printing, too.



Price List

Product Name	Selling Price	Our Product ID	Taxable	Pounds	Ounces	Discontinued
50pk Audio CD-R	**$39.99**	50ACD-121	☑	1	12	□
50-pk Floppy Disks	**$39.99**	50FDPK	☑	1	8	□
Big Subwoofer	**$29.99**	BSW-3232	☑	3	4	□
Budget MP3 Player	**$10.00**	BMP3-01	☑	1	0	□
Golden Whistle	**$100.00**	GW-123	☑	0	8	□
Kozmik Video Camera	**$1,000.00**	KVC-2322	☑	6	8	□
Lawn Flamingo	**$29.99**	FF-232	☑	2	6	□
Lucky Rabbits Foot	**$7.99**	RF-3322	□	0	6	□
Magic Inkwell	**$14.99**	IW-2322	☑	1	4	□
Microwave Blow Dryer	**$129.99**	TBD001	☑	1	8	□
Nuclear Pencil Sharpener	**$179.99**	NPS-232	☑	2	8	□
Old Time Stock Ticker	**$500.00**	OTST-001	☑	10	4	□
Scanner cable	**$9.98**	SC001	☑	0	8	□
Unbreakable PDA	**$159.99**	EV-567	☑	1	0	□
WayCool Scanner	**$89.99**	WCS3432	☑	12	0	□

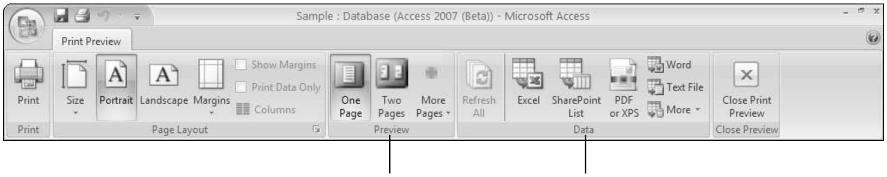
Figure 2-1: A report in Print Preview.

When the Print Preview window is active, the Ribbon looks like Figure 2-2.

Adjusting the view

Notice that when you're in Print Preview mode, your cursor changes to a magnifying glass and your report is shrunk to display an entire page on the screen. Click anywhere on the report to zoom in. Click the report a second time to shrink it back to fit on the screen. Alternatively, you can use the Zoom control located in the bottom right of the Access window. Click the minus (–) button to reduce the size by 10 percent. Click the plus (+) button to increase the size by 10 percent. Drag the slide control to change the size in 1 percent increments.

Figure 2-2: The tools on the Print Preview tab of the Ribbon.



Preview group

Data group

Use the vertical scroll bar or press the Down Arrow, Up Arrow, Page Down, and Page Up keys on your keyboard to scroll the report up and down within the Print Preview window. Use the horizontal scroll bar or press the Left Arrow and Right Arrow keys on your keyboard to pan sideways. To see other pages of the report, use the navigation buttons in the lower-left corner of the Print Preview window.

Looking at lots of pages

You can zoom *way* out by displaying two or more pages at the same time. Click the Two Pages button on the Print Preview tab on the Ribbon to display two pages at a time, side by side. Though useless for close proofreading, with this view you can tell where section breaks come and how full the pages are, as shown in Figure 2-3. To see more than two pages, click the More Pages button on the Print Preview tab on the Ribbon and choose an arrangement of pages: Your options are Four, Eight, and Twelve pages. Use the Zoom button to zoom in and out on Two Pages view and More Pages views.

TIP

Right-click the report and select a Zoom value of 5% to 1000% or type your own value in the Zoom menu option.

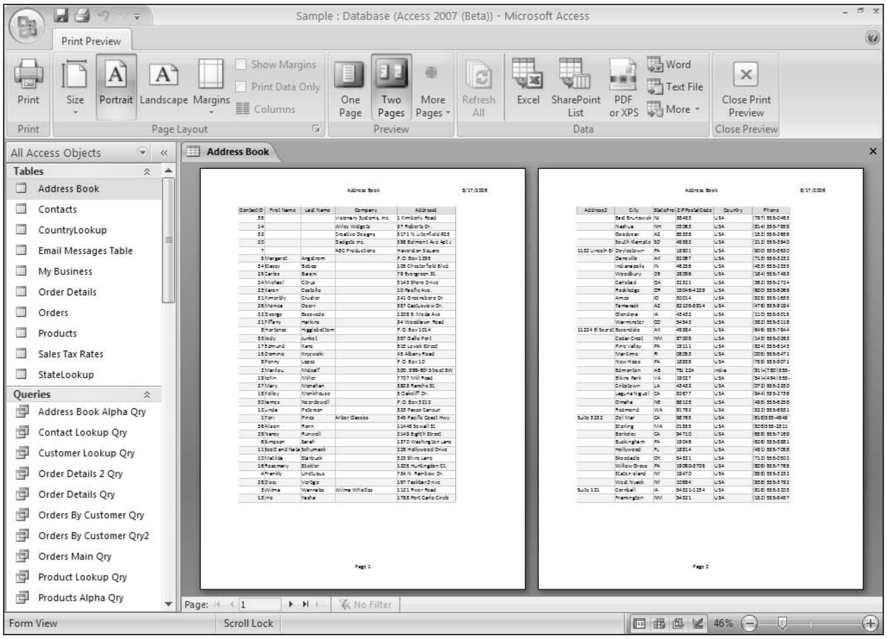


Figure 2-3: You can see two pages at a time, but you can't necessarily read them.

Right-click the report and point to Multiple Pages. You can select from 1 × 1, 1 × 2, 1 × 3, 2 × 1, 2 × 2, or 2 × 3.

Previewing reports with parameters

Some reports use parameters — the record source for the report or one or more report controls that contain prompts for information. (See Chapter 1 of this minibook for how to make a control that prompts for a parameter; see Book III, Chapter 2 for how to make a parameter query.) If your report has parameters, Access prompts you to type values for the parameters each time you preview the report. After you look at the report, you may want to try different values for the parameter(s). To enter new parameters, close the report and reopen it or switch to Design view and back to Print Preview.

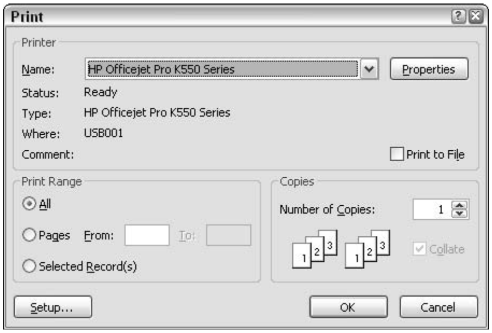
Formatting the Page

Access stores print setup information with each report, so you can design different reports to be used with different printers or with different paper.

Selecting a printer

When formatting your report in Print Preview, Access takes into account the size and shape of the paper you plan to use. (Okay, most paper is rectangular, but you know what we mean.) Before you're ready to print, specifying what printer you plan to use is important.

If you plan to use the Windows default printer, you don't have to do anything. If you want to print to a different printer, choose the printer when you're ready to print. Click the Print button in the Print group (it's the only button in the Print group) to display the Print dialog box, shown in Figure 2-4. Select your printer from the Name drop-down list.



Print

Printer

Name: HP Officejet Pro K550 Series

Status: Ready

Type: HP Officejet Pro K550 Series

Where: USB001

Comment:

□ Print to File

Print Range

● All

○ Pages From: To:

○ Selected Record(s)

Copies

Number of Copies: 1

☑ Collate

Figure 2-4: Selecting your printer.

Click the Size button in the Page Layout group of the Print Preview tab on the Ribbon and select your paper size from the drop-down list.

TIP

To see what printers your computer is configured to use — including the default — choose Start➪Printers and Faxes (or Start➪Control Panel➪ Printers and Other Hardware➪Printers and Faxes, depending on how Windows is configured). The Printers and Faxes window appears, listing all the printers that your computer is configured for. The printer with an icon that includes a little check mark is the default printer. Right-click a printer and choose the Properties option from the shortcut menu to see how the printer is configured. To make a particular printer the default printer, right-click its name and choose the Set as Default Printer option from the shortcut menu that appears.

Setting margins, paper size, and paper orientation

Other print settings you can configure from the Print Preview tab on the Ribbon are the following:

- **Margins:** Click the Margins button to select Normal, Wide, or Narrow from the drop-down list.
- **Paper orientation:** Click the Portrait button to print normally on the page, or click the Landscape button to print sideways.
- **Paper size:** Click the Size button and choose the size of the paper (or envelope or sheet of labels) on which you plan to print the report.

TIP

If you end up changing the margins for almost every report you create, you can change the default margins for all new reports. Click the Microsoft Office Button, then click the Access Options button to display the Access Options dialog box shown in Figure 2-5. Click the Advanced button and change the default Printing margin settings.

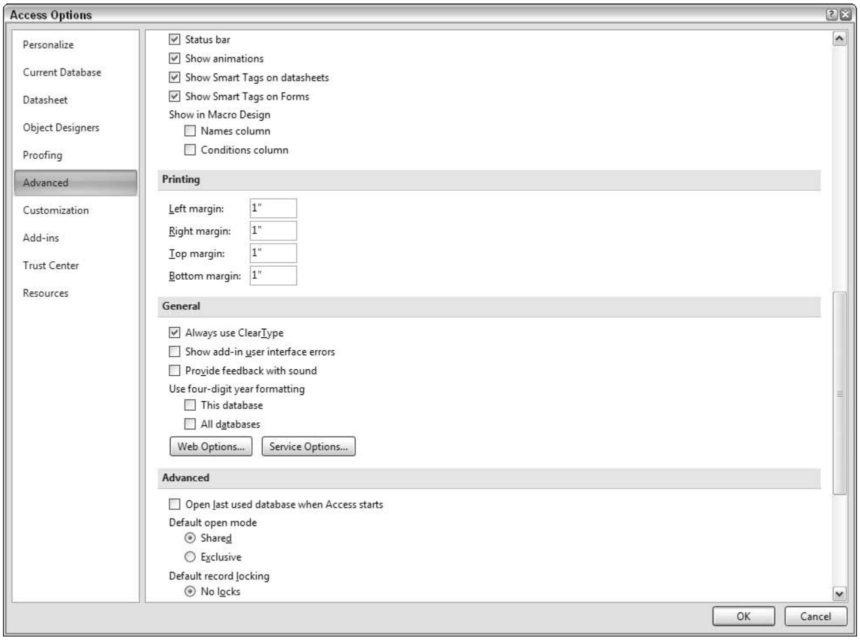
Controlling page breaks

Normally, Access fills each page from top to bottom, starting a new page only when the previous one is full. However, you can insert a page break (start a new page) at other times. You can add page breaks to a report in several ways:

- **After each record (print one page per record):** Set the `Force New Page` property of the Detail section to either the `Before Section` or `After Section` setting. If you choose the `Before & After` setting for this property, Access prints a blank page both before and after the page(s) for each record. With the report in Design view, double-click the gray bar at the top of the Detail section to display the Property sheet for the section, and then click the Format tab to see the `Force New Page` property.

- **After each group of records:** See Chapter 1 of this minibook for how to group records. Set the `Force New Page` property for the Group Footer to the `After Section` setting. Access prints the Group Header section, the Detail section for each record in the group, the Group Footer section, and then starts a new page for the next group of records.
- **Within a section of your report:** Use a page-break control. For example, the Detail section of the report may print a packing slip and an invoice for each order on separate pages. To add a page-break control to the Detail section of the report, click the Insert Page Break button on the Controls group of the Design tab on the Ribbon, and then click where you want the page break to occur. Access puts the page-break control at the left margin of the report.

Don't place page-break controls in the Page Header or Page Footer sections. Doing so starts a new page at the top or bottom of every page, which just creates confusion (and an error).



Access Options

☑ Status bar
☑ Show animations
☑ Show Smart Tags on datasheets
☑ Show Smart Tags on Forms
Show in Macro Design
□ Names column
□ Conditions column

Printing

Left margin: 1"
Right margin: 1"
Top margin: 1"
Bottom margin: 1"

General

☑ Always use ClearType
□ Show add-in user interface errors
□ Provide feedback with sound
Use four-digit year formatting
□ This database
□ All databases

Advanced

□ Open last used database when Access starts
Default open mode
● Shared
○ Exclusive
Default record locking
● No locks

Figure 2-5: Set your margins using the Access Options dialog box.

Avoiding blank pages

Almost every Access user winds up with blank pages between each printed page of a report. The blank pages appear in Print Preview, but what causes them?

Access knows the width of your paper and how much space to leave for the left and right margins because these sizes are specified in the report's Property sheet. Access adds the width of your report to the left and right margins to come up with the total width of the printed report. If the total is wider than your paper, Access splits the report into vertical bands, and prints the left and right halves of the report onto separate pieces of paper, so you can tape them together to create a very wide report.

If the report is just a *little* bit too wide to fit across one piece of paper, the text of the report is all in the left half, leaving the right half blank. These blank right halves are the blank pages that Access prints. To get rid of them, follow these steps:

1. **Choose Access Options ⇨ Advanced from the Office Button menu.**

   You see the Access Options dialog box. If you don't see the Printing section, scroll up or down until it is displayed (refer to Figure 2-5).

2. **Subtract the left and right margin settings from the width of your paper to get the maximum width of the report.**

   Standard U.S. paper is 8½ inches wide. If the left and right margins are too wide, make them smaller in this dialog box, and then use the new values in your calculation. For example, if your paper is 8½ inches wide and you have half-inch left and right margins, your report can't be more than 7½ inches wide.

3. **Click OK to exit the Access Options dialog box.**

4. **In Design view of the report, note the report's width — the location along the ruler of the right edge of the grid area.**

   Alternatively, look at the `Width` property of the report in the Property sheet. (Double-click the gray box in the upper-left corner of the Design View window where the rulers meet to display the Property sheet.)

5. **If the report is too wide to fit on the page, drag the right edge of the report leftward.**

   If the edge won't move, a control extends to the right of where you want the page to end. Move or shrink any control that extends too far to the right and move the right edge of the report to the left. Alternatively, change the `Width` property of the report.

Another possible reason for blank pages is an incorrect setting for the `Force New Page` property of one of the sections of the report. See the preceding section for how to control page breaks before or after groups.

Printing only the data

If you're printing on a form, rather than on blank sheets of paper, you can design a report that looks like the form, including labels and lines that match the form. When you print the report, you can skip printing the labels and lines and print only the data. In Print Preview, check the Print Data Only checkbox in the Page Layout group. Access updates the Print Preview to show only your report data.

Printing the Report

After you have your page and margin options set, you're ready to risk wasting paper to print your report. You can print your report when it's open in Print Preview, in Design view, or not open at all. Choose the report you want to print, either by selecting the report in the Navigation Pane or by opening the report in Design view or Print Preview. Then click the Print button on the Print Preview tab on the Ribbon, click the Office Button and choose Print, or press Ctrl+P. Microsoft Access displays the Print dialog box shown in Figure 2-4 (the same Print dialog box that most Microsoft programs display). Click the Setup button if you want to take a look at the Page Setup dialog box. Otherwise, click OK to send your report to the printer.

To send your report directly to the printer without displaying the Print dialog box, click the Office Button and select Print ⇨ Quick Print. Make sure you're really ready to print before you click!

You may want to print only part of a report — say, just the first page to see how the margins look — or reprint a specific page. On the Print dialog box (shown in Figure 2-4), in the Print Range section, click the Pages radio button and enter the starting and ending page numbers in the From and To boxes.

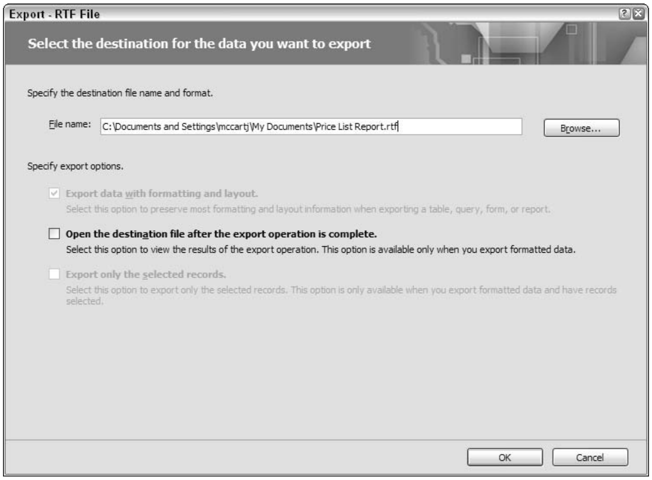
Sending a Report to Another Application

The nice thing about Microsoft Office is that all the programs are designed to work together. Sometimes they even *do* work together.

For example, what if you want to include a report from your Access database in a Word document? Office has a cool feature called OfficeLinks that makes this incredibly easy. To use it, follow these steps:

1. **In the Navigation Pane, click the report you want to export to Microsoft Word.**
2. **Click the External Data tab on the Ribbon.**
3. **Click the Word button on the Export group of the External Data tab on the Ribbon.**

   The Export — RTF File dialog box shown in Figure 2-6 opens.



Export - RTF File

Select the destination for the data you want to export

Specify the destination file name and format.

File name: C:\Documents and Settings\mccartj\My Documents\Price List Report.rtf

Specify export options.

☑ **Export data with formatting and layout.**
Select this option to preserve most formatting and layout information when exporting a table, query, form, or report.

□ **Open the destination file after the export operation is complete.**
Select this option to view the results of the export operation. This option is available only when you export formatted data.

□ **Export only the selected records.**
Select this option to export only the selected records. This option is only available when you export formatted data and have records selected.

Figure 2-6: The Export – RTF File dialog box.

4. **Type a name for the exported report in the File Name text box.**

   If you want to open the exported report automatically in Microsoft Word, check the Open The Destination File After The Export Operation Is Complete check box.
5. **Click OK.**

That's all there is to it! The exported file is a normal RTF (Rich Text Format) file and can be opened in Microsoft Word or any other program that supports RTF.

If you want to use a table or query with the Microsoft Word merge feature, you can. Select the table or query in the Navigation Pane. Click the More button on the Export group of the External Data tab on the Ribbon, choose Merge It with Microsoft Office Word, and follow the prompts of the Microsoft Word Mail Merge Wizard. When you open the document in Word into which you want to merge your data, click Insert Word Field to include a field from your table or query in the document.

Chapter 3: Creating Charts and Graphs from Your Data

In This Chapter

- **Making charts and graphs using the Chart Wizard**
- **Drawing bar charts**
- **Crafting line and area charts**
- **Displaying pie and doughnut charts**
- **Doing XP scatter and bubble charts**
- **Changing the format of your chart**
- **Making PivotCharts from PivotTables, tables, and queries**
- **Tweaking your PivotChart**

Charts and graphs often communicate the meaning of your data better than columns of names and numbers. (What's the difference between a chart and a graph? Actually, they are two words for the same thing.) Microsoft Office 2007 comes with a charting component called Microsoft Graph (also called Microsoft Chart) that you can use from within Access to create a wide variety of graphs. You can run a Chart Wizard to create charts using Microsoft Graph.

PivotCharts are another Microsoft Office component that you can use with Access. A PivotChart is dynamic, which means that you can easily adjust it while you're looking at it. As you drag field names around the PivotChart, or make choices from drop-down lists, the chart changes immediately on-screen.

Which should you use — charts or PivotCharts? Depends on what you want to do with what you get:

✦ PivotCharts are designed for the screen, where you can fool around with their settings and explore your data graphically.

✦ Regular charts (the kind that Microsoft Graph draws) are designed to print out, and include many more formatting options.

PivotTables are like PivotCharts — they also let you analyze your data on-screen. PivotTables display your data as text, while PivotCharts graph your data. For more information about PivotTables, see Book III, Chapter 4.

Displaying Information with Charts and Graphs

Access databases contain different types of objects: tables, queries, forms, reports, and the rest. But what about charts? Where are they stored?

Strangely, Access stores charts as controls on forms or reports. Before you make a chart, you create a new form or report — or open an existing one — and then add a chart control. In this chapter, we describe storing your chart controls in reports, but you can include them in forms if you prefer — depending on whether you want to view the charts on-screen or print them out.

Actually, storing charts as controls on forms or reports makes sense if you know what's going on behind the scenes. Access itself doesn't include any graph-drawing features at all. Instead, chart controls are *object frame* controls that can contain a wide variety of things, including pictures, Word documents, Excel spreadsheets, sound files, video clips — you name it. What we call a *chart control* is actually an object frame control that contains a Microsoft Graph chart object. Luckily, you don't need to worry about object frames — you can just create your new chart control using a wizard. If you insist on making a chart control manually, see the sidebar, "Making charts the old-fashioned way," later in this chapter, but don't say we didn't warn you.

We recommend starting with the Chart Wizard and *then* customizing the chart afterward. Heck, why not make the wizard do most of the work?

The Access Chart Wizard is very limited — Microsoft Graph can draw more types of charts. If you want to create a stacked bar chart, radar chart, or multi-ring doughnut chart, the wizard can't help you. You can make a similar chart with the wizard, and then modify the chart afterwards using Design view. Another method of making better charts is to export your data to Microsoft Excel 2007 — yet another component of Microsoft Office 2007 — and use its more powerful Chart Wizard. See Book II, Chapter 4 for how to export records from Access to Excel.

Creating charts with the Chart Wizard

If you want to create charts in Access, the Chart Wizard is the only good way to start. You may want to add a chart to an existing report, or create a chart that stands alone (no other controls are on the report). The Chart Wizard allows you to do either.

Whether you create a new report for your chart or add a chart to an existing report, you start at the Reports list in the Navigation Pane of the Database window. If the Navigation Pane isn't visible, press the Shutter Bar Open/Close button (>>). Then scroll to see the list of your existing reports.

Starting the Chart Wizard to add a chart to an existing report

You can add a chart to a report that you already created by adding a chart control to your report. Follow these steps:

1. **Open the report in Design view (by right-clicking the report and selecting Design View) and click the Insert Chart button in the Controls group of the Design tab on the Ribbon.**

   Access gives you no clue that you have, in fact, issued this (or any other) command — except one: When you move your mouse pointer back to the Design View window, it appears as a teeny little graph.

2. **Click the section of the report where you want the chart to appear.**

   The Chart Wizard starts.

3. **Click the Tables, Queries, or Both radio button to display the list from which to make your choice. Make your selection and click Next.**

   The wizard is now up, running, and ready to ask lots more questions about what you want your chart to look like. (Skip forward to the relevant section, "Answering the Chart Wizard's questions.")

Starting the Chart Wizard to create a chart in a new report

Perhaps you'd like to make a stand-alone chart — one that is all by itself in a report. You can create a new report with a new chart object in it by following these steps:

1. **Click the Report Design button in the Reports group of the Create tab on the Ribbon.**

   A blank Report makes an appearance in Design view.

2. **Click the Insert Chart button on the Design chunk, then click and drag to choose the size and placement of your chart.**

   The Chart Wizard appears.

3. **Choose the table or query containing the data you want to chart, and click Next.**

   Read on to find out how to tell the wizard how you want your chart to look.

Answering the Chart Wizard's questions

After you start the Chart Wizard and choose the table or query that provides the data, follow these steps to create a chart:

1. **Choose the fields you want to chart by moving them from the Available Fields list to the Fields for Chart list, and then click Next.**

To move a field from one list to the other, select the field and click the arrow button between the two lists, as shown in Figure 3-1.

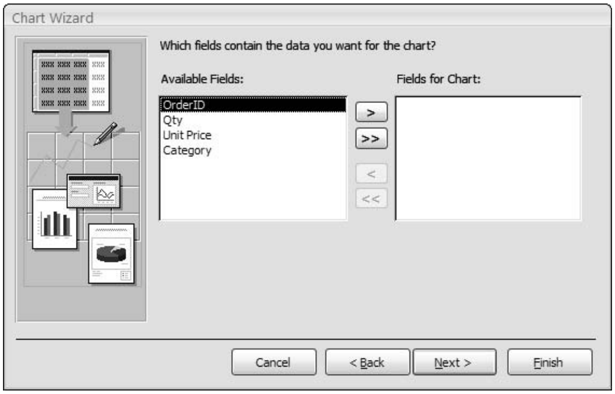


Chart Wizard

Which fields contain the data you want for the chart?

Available Fields:

OrderID
Qty
Unit Price
Category

Fields for Chart:

Figure 3-1: Choose which fields to include in the chart.

If you are charting values by date, make sure that you include the field that contains the date value. For example, if you want to chart sales per week for each week of the year, you need to choose both the field that contains the sales numbers and the field that contains the dates of the sales. The fields don't have to be weekly totals: The Chart Wizard can total your fields for you.

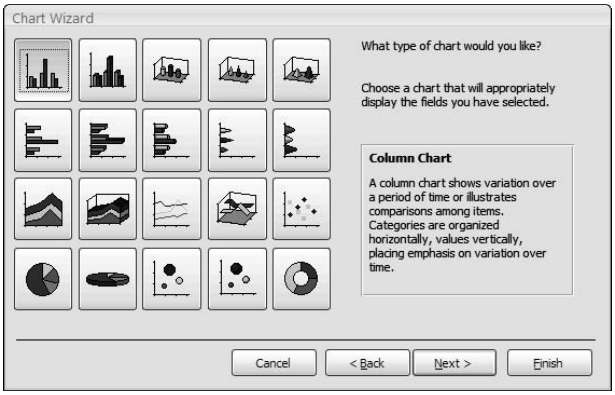
In Step 3, you tell the wizard how to represent each field, and you don't have to represent all the fields you choose here. Go ahead and include any field that you *may* want to include on the chart.

2. **In the next window of the Chart Wizard (see Figure 3-2), select the type of chart that you want to create, and then click Next.**

   When you select a chart type, the wizard displays the name of that type of chart as well as some information about that type of chart and the kind of data that it displays best.

3. **Drag fields onto the chart on the left side of the wizard window and tell the wizard how to use the fields you've selected, as shown in Figure 3-3.**

   The chart shows three labels: the Axis (the horizontal X-axis on most types of graphs), the Data (usually the vertical Y-axis), and the Series (usually fields displayed in the chart as bars, lines, or other shapes). The fields that you choose appear as buttons on the right side of the window. You specify how to use each field by dragging its field name to the sample chart. If Access guessed wrong about how to use the fields, you can drag the field name from the chart on the left side back to the field list at the right.



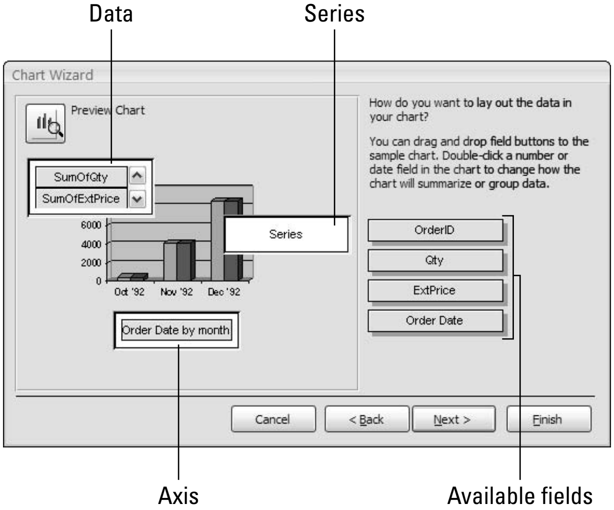
What type of chart would you like?

Choose a chart that will appropriately display the fields you have selected.

Column Chart

A column chart shows variation over a period of time or illustrates comparisons among items. Categories are organized horizontally, values vertically, placing emphasis on variation over time.

Figure 3-2: You're not limited to boring old bar and line charts!



How do you want to lay out the data in your chart?

You can drag and drop field buttons to the sample chart. Double-click a number or date field in the chart to change how the chart will summarize or group data.

Figure 3-3: Laying out your fields on the chart.

Double-click a field's box to see more detail. You see a dialog box that allows you to change the totaling or grouping for that field.

TIP

How the Axis, Data, and Series settings work depends on the type of chart you are creating. The next four sections describe how to specify fields for bar, line, pie, and other types of charts. Remember: You don't have to use all the fields.

4. **Click the Preview Chart button in the top-left corner of the window to see how your chart looks so far. Check out the results and click the Close button to return to the Chart Wizard window.**

   The Sample Preview window (shown in Figure 3-4) helps you figure out whether you chose the right fields for the X-axis, Y-axis, and Series settings.

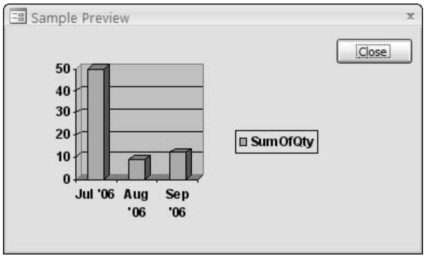


Figure 3-4: Preview your chart to see whether you have correctly specified which fields go where.

5. **Repeat Steps 3 and 4 until the chart looks right. When it does, click Next.**
6. **Specify a title, whether to display legends, and whether to open the report containing the new chart control in Design view or Print Preview. After making your selections, click Finish.**

   The title for your report appears at the top of the report. The wizard suggests the name of the table or query you chose as the record source. Legends show what the colors of the bars, lines, or pie sections mean.

   The wizard creates a new chart control in your new or existing report.

After the Chart Wizard creates your chart control, you can move the control around your report by dragging it. You can also resize the chart by selecting the control and then dragging the black handles on the edges of the control. (If you double-click the chart control, you find yourself in a strange new editing mode described in the "Formatting charts with colors, legends, and titles" section, later in this chapter.)

WARNING!

In Design view, Access shows a sample chart, not the actual chart. The chart is of the type that you select, but with sample data. Don't worry, your real chart is on the report — switch to Print Preview to see the actual chart.

A report can contain more that one chart control. You may want to make a report that contains three chart controls that display three different charts. Just make the additional controls in Design view by clicking the Insert Chart button and clicking and dragging where you want the new control to appear.

Now you know how to use the Chart Wizard to create a chart. The next few sections describe popular types of charts — bar, line, and pie charts.

Making bar charts

The Chart Wizard can make a bunch of different kinds of bar charts. The types of bar charts in which the bars run vertically appear on the first row of buttons in Figure 3-2:

- **Column Chart:** Flat, vertical bars.
- **3-D Column Chart:** Three-dimensional-looking vertical bars.
- **Cylinder Column Chart:** Same thing as a column chart, but the bars are cylindrical.
- **Cone Column Chart:** Another column chart, but with cones instead of bars.
- **Pyramid Column Chart:** Ditto, but with pyramids.

You can also make the same charts run horizontally (these appear on the second row of buttons in Figure 3-2):

- **Bar Chart:** Flat, horizontal bars.
- **3-D Bar Chart:** Three-dimensional-looking horizontal bars.
- **3-D Cylinder Bar Chart:** Same thing as a bar chart, but the bars are cylindrical.
- **3-D Cone Bar Chart:** Ditto, with horizontal cones (they look rather odd, we think).
- **3-D Pyramid Bar Chart:** Ditto, with horizontal pyramids (which look even odder).

To see little pictures of these, look at the top two rows of buttons in Figure 3-2, earlier in this chapter. Unfortunately, the Chart Wizard can't draw stacked bar charts — to make them, you have to choose another type of bar chart in the Chart Wizard, and then change the chart type to a stacked bar chart later (see the section, "Changing your chart," later in this chapter).

The key to creating bar charts with the Chart Wizard is to specify the right fields for the Axis, Data, and Series — the field selections you made in Step 3 of the previous section. Keep reading to find out how the Axis, Data, and Series settings work.

The X-Axis setting

For graphs with vertical bars (or other vertical shapes), set the X-Axis to the field that determines the labels that run along the bottom of the graph. For horizontal bar graphs, the X-Axis runs up the left side of the graph. This setting also determines what bars sprout up from the x-axis. A bar graph has one bar (or group of bars) for each value (or range of values) of the X-Axis setting. Figure 3-5 shows two bar charts, one vertical (select Column Chart to get this particular chart type) and one horizontal (select Bar Chart for this one). The X-Axis setting in Figure 3-5 is the `Order Date` field and the Y-Axis setting is the `Qty` field.

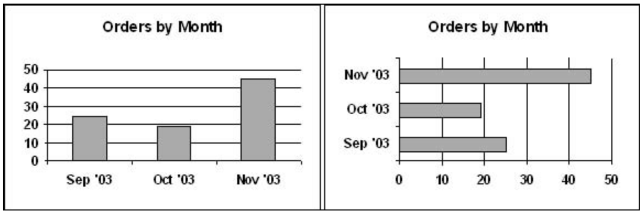
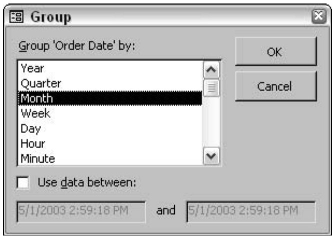


Figure 3-5: Vertical and horizontal bar charts, with Order Date as the Axis setting.

If you use a Date/Time field for the X-Axis setting, you can choose to group the dates into time periods such as a month or year. The X-Axis setting in the Chart Wizard window tells you how Access plans to group the information by date: An `Order Date` field may appear as `"Order Date by month"` — refer to Figure 3-3. To change the grouping, double-click the X-Axis field to display the Group dialog box, as shown in Figure 3-6. You can choose to group your data by year, quarter, month, and so on. The Group dialog box also allows you to choose to limit the values plotted on your graph to values within a specified date range. Just select the Use Data Between check box and enter the beginning and end dates you want for your chart. Access ignores records with dates outside that range.


Group

Group 'Order Date' by:

- Year
- Quarter
- Month
- Week
- Day
- Hour
- Minute

□ Use data between:

5/1/2003 2:59:18 PM and 5/1/2003 2:59:18 PM

Figure 3-6: How would you like to group values by date?

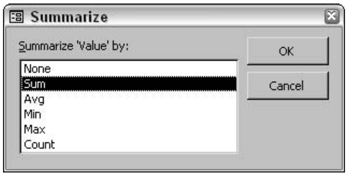
Strangely, you can’t control how numeric or text values are grouped, or limit their ranges on the graph.

The Y-Axis setting

For vertical bar charts, drag the fields that determine the heights of the bars — along with the values that appear up the left side of the chart — to the Y-Axis setting. On horizontal bar charts, the Y-Axis fields control the lengths of the bars and the values that run along the bottom of the chart. In Figure 3-5, the Y-Axis field contains the number of items sold; it runs up the left side of the chart on the vertical bar chart and across the bottom of the chart on the horizontal bar chart.

If you group dates together along the X-axis, you can specify how the values are combined into the bars. If you want to graph sales by year and your record source has one record for each order, you may set the Y-Axis field to be the `Grand Total` field of each order. You can then specify how to combine the values of the orders into years — you may want the total value of all the orders for the year, or you may want the average value. The Y-Axis setting in the Chart Wizard window indicates how the values are combined: In Figure 3-3, the Y-Axis setting contains two variables, `SumOfQty` and `SumOfExtPrice`, so Access sums up the `Qty` and `Ext Price` fields for the orders in each year.

To change how Access combines the values of a Y-Axis field, double-click the Y-Axis field to display the Summarize dialog box, as shown in Figure 3-7. Then choose how you want the values for each time period combined: Sum, Avg (average), Min (minimum value), Max (maximum value), or Count (number of records).


Summarize

Summarize 'Value' by:

- None
- Sum
- Avg
- Min
- Max
- Count

Figure 3-7: How do you want to combine the values for each bar?

Unlike the X-Axis setting, the Y-Axis setting can be more than one field. If you drag more than one field to the Y-Axis setting, you see a listing of the Y-Axis fields, as shown in Figure 3-8. For each Y-Axis setting, you get a separate bar.

Two fields for the Data setting

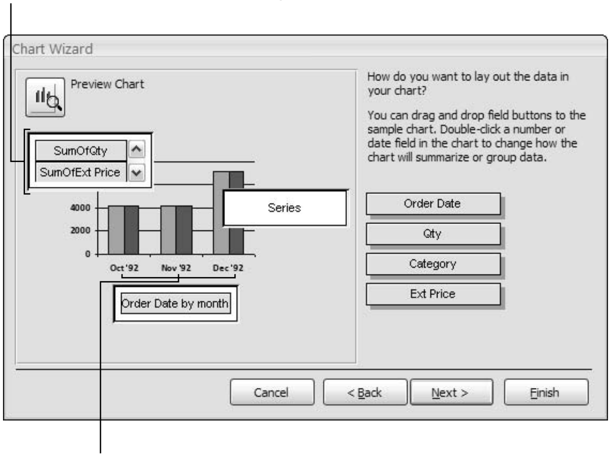


Chart Wizard

How do you want to lay out the data in your chart?

You can drag and drop field buttons to the sample chart. Double-click a number or date field in the chart to change how the chart will summarize or group data.

Two bars appear in each chart entry

Figure 3-8: This chart has two sets of bars for each month: one for Quantity and one for Extended Price.

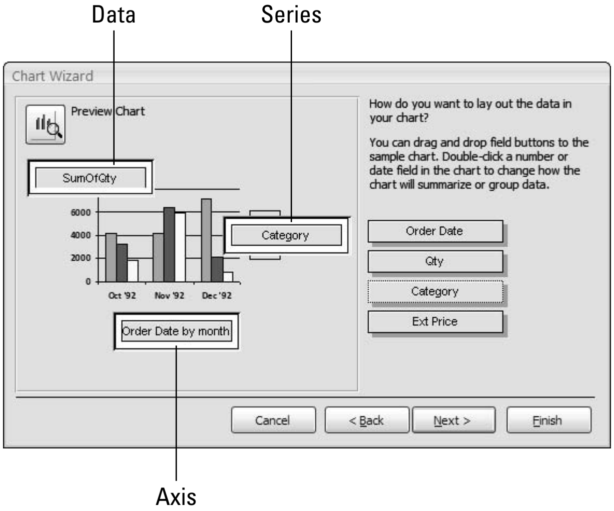
TIP

You can drag the same field to the Y-Axis setting twice — for example, you may want to see the count and the total of the same field.

The Series setting

Unlike the X-Axis and Y-Axis settings, the Series setting in the Chart Wizard is optional — most charts leave this setting blank. The field used for the Series setting tells Access how to break down the bars (or columns, cones, or pyramids) into a group of smaller bars.

If you graph sales by month, each bar normally shows the total of the sales records for that month. If you drag a field to the Series setting, Access divides the bar for each month up into several bars according to the value of the Series field. If you set the Series setting to a field that represents what type of product was sold in each order, you get a group of bars for each month, with one bar for each type of product. Figure 3-9 shows the Chart Wizard settings for a graph that separates sales by Category, and Figure 3-10 shows the resulting chart (there are five categories).



How do you want to lay out the data in your chart?

You can drag and drop field buttons to the sample chart. Double-click a number or date field in the chart to change how the chart will summarize or group data.

Figure 3-9: The `Category` field is used as the Series setting, which splits each month's sales into separate bars for each product category.

If you choose three or more fields to use in your chart, the Chart Wizard usually guesses that you want to use one of the fields as the Series setting. But for most charts, you use only the X-Axis and Y-Axis settings — just leave the Series setting blank. If the wizard puts a field there, drag it back over to the list of fields on the right side of the wizard's window.

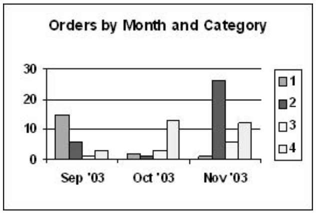


Figure 3-10: The Axis field contains sales dates grouped by month, the Data field contains the values of the products sold, and the Series field contains the product category (Computer, Media, and so on).

Making line and area charts

Line and area charts work similarly to bar charts. A bar chart draws a bar (or other shape) for each value of the X-Axis series, with its height determined by the Y-Axis series. A line chart works the same way, but instead of drawing a bar, Access draws a dot where the top of the bar would be, and then connects the dots. An area chart is basically the same thing, but Access colors in the area under the line, as shown in Figure 3-11. Line and area charts appear on the third row of buttons in Figure 3-2 (they are all but the last button in that row).

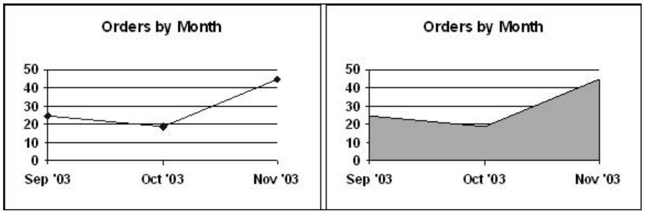


Figure 3-11: Line and area charts work the same way bar charts do.

In a line or area chart, the X-Axis series defines the labels that run along the bottom of the graph and the Y-Axis series defines the distance from the bottom of the chart up to each dot that the lines connect. If you have two or more Y-Axis series, Access draws a line for each one and (for an area chart) colors the area between one line and the next (see the left-hand chart in Figure 3-12).

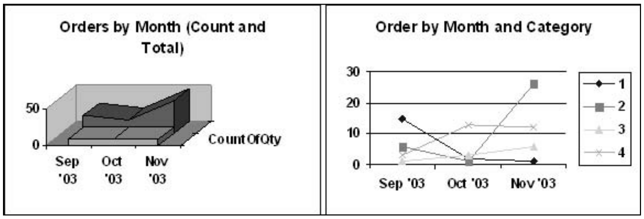


Figure 3-12: An area chart with two Data fields shows one area in front of the other (left). The Series field splits the quantity of the Data field into several lines or areas (right).

As with bar charts, Access uses the Series field to split the amounts for each line into several, lower lines. The right-hand chart in Figure 3-12 shows a line chart with `Category` as the Series field. (This is the same data that Figure 3-10 displays as a bar chart.)

Making pie and doughnut charts

A pie chart shows how a total amount is split up by percentages. Access needs to know what field contains the numbers you want summed to make the total amount as well as what field contains the information by which to split this total into pie slices. A doughnut chart is a line pie chart with a hole in the middle, except that you can specify more than one field, and you get a concentric ring for each field. Pie and doughnut charts appear on the fourth row of buttons in Figure 3-2.

When you run the Chart Wizard, choose just two fields to include in the chart:

- ✦ The Y-Axis field is the one that contains numbers for Access to sum up to create the total pie. For a doughnut chart, you should be able to specify more than one Y-Axis field, and get a concentric ring for each field. If you can't specify all the fields in the Chart Wizard, you can add them later; see "Changing which data is charted," later in this chapter.

- ✦ The Series field can be numeric, text, Yes/No fields, or Date/Time fields. Access makes a separate pie slice for each value of this field.

The left-hand chart in Figure 3-13 shows a pie chart in which the Y-Axis field is a numeric field with the total amount of each order, and the Series field is a category field. The rightmost chart shows the same information represented as a doughnut chart.

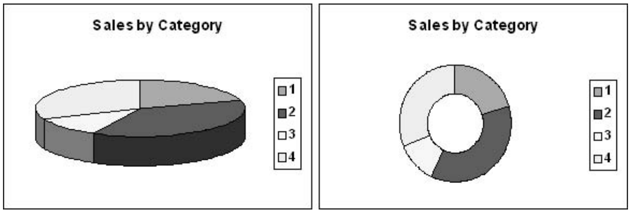


Figure 3-13: A pie chart (left) and a doughnut chart (right).

Making bubble and XY scatter plots

An XY scatter plot needs two numeric fields and plots one field against the other. For each record, you see a point with the horizontal and vertical position determined by the numbers in the fields. A bubble chart works the same way, except that Access draws a circle instead of a point, and the numeric value of a third field determines the size of the circle.

You can try making these graphs in the Chart Wizard, but we haven't had much luck. (Consider exporting the data to Microsoft Excel and charting it there.) If you want to try the Chart Wizard, drag the numeric field you want to graph along the horizontal (X) axis to the Series setting, and drag the field you want to graph along the vertical (Y) axis to the Data setting. If the wizard decides to aggregate either of the fields (you see `"Sum Of"` — the field name), double-click the field name and change the aggregation to the `None` setting.

Changing your chart

The Access Chart Wizard can't make all the types of charts the Microsoft Graph can draw. It can't even make all the charts that the Excel Chart Wizard can make — wouldn't you think that these two wizards would get together sometime and compare notes? Luckily, you can change the settings of a chart after the wizard creates it. You can fix charts that don't look quite right, as well as create charts that the Chart Wizard doesn't know about.

To modify a chart, you change the properties of the chart control on the report that contains the chart. This section gives you the general idea of how to modify a chart after you make it, while the next two sections provide more details.

Making charts the old-fashioned way

By far the best way to create a chart is by using the Chart Wizard. However, if you want to create one without a wizard, be our guest — just don't say we didn't warn you. Follow these steps:

1. **With a report or form open in Design view, display the Design tab on the Ribbon.**

2. **Click the Unbound Object Frame button on the Controls group on the Ribbon, and then click in the Design View window where you want your chart to appear.**

   You see a Microsoft Access dialog box (which really ought to be called something like the Insert Object dialog box).

3. **If you've created a graph in some other program (perhaps in Excel or Word), choose the Create from File option, click the Browse button, and choose the file. If you are making a new chart, choose the Create New option and choose Microsoft Graph Chart from the Object Type list. Then click OK.**

   Yes, that's "Microsoft Graph Chart," which sounds redundant, but the point is that you are creating a chart by using the Microsoft Graph program. Makes sense!

Access creates a sample bar chart based on sample data that appears in a Datasheet window. To replace the data with your own data, type your own headings and numbers in the Datasheet window. To change the type of chart, see the section, "Changing your chart."

To modify an existing chart, follow these steps:

1. **Open the report that contains the chart in Design view. (Right-click the report in the Navigation Pane and select Design View.)**

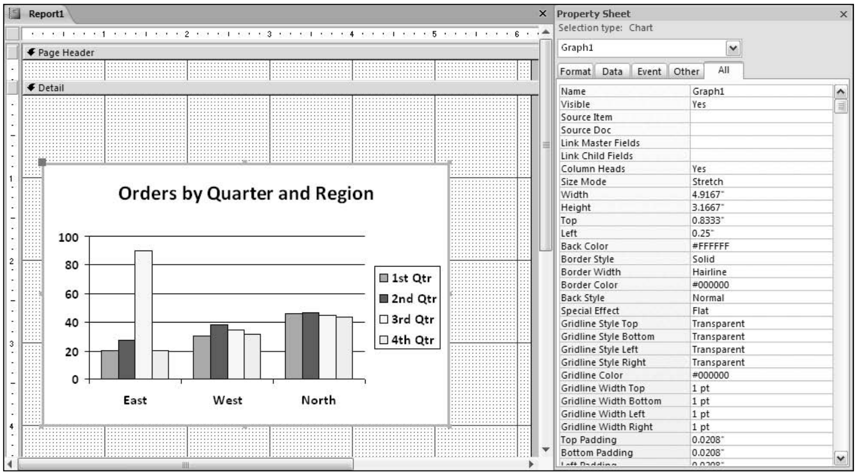
   If the report is already open in Print Preview, then click the down arrow on the View button to switch to Design view. You see the report in Design view, including the chart control that defines the chart.

   REMEMBER In Design view, the chart control displays sample data, not the actual data. Don't worry — Access hasn't forgotten the actual data you want to plot. Just switch to Print Preview to see the real chart.

2. **Click once in the chart control to select it.**

   Now you can drag it to a different location on the report, or resize it.

   You can tell when the chart control is selected because a selected control sprouts handles — little black squares at the corners and the middle of the sides — as shown in Figure 3-14. Drag anywhere in the middle of the chart control to move the chart. Drag a handle to resize the chart control.



Property Sheet

Selection type: Chart

Graph1

Name	Graph1
Visible	Yes
Source Item	
Source Doc	
Link Master Fields	
Link Child Fields	
Column Heads	Yes
Size Mode	Stretch
Width	4.9167"
Height	3.1667"
Top	0.8333"
Left	0.25"
Back Color	#FFFFFF
Border Style	Solid
Border Width	Hairline
Border Color	#000000
Back Style	Normal
Special Effect	Flat
Gridline Style Top	Transparent
Gridline Style Bottom	Transparent
Gridline Style Left	Transparent
Gridline Style Right	Transparent
Gridline Color	#000000
Gridline Width Top	1 pt
Gridline Width Bottom	1 pt
Gridline Width Left	1 pt
Gridline Width Right	1 pt
Top Padding	0.0208"
Bottom Padding	0.0208"
Left Padding	0.0208"

Figure 3-14: A chart control in Design view.

Property Sheet

When the chart control is selected, click the Property Sheet button on the toolbar to display the Property sheet, which is also shown in Figure 3-14. In the Property sheet, you can change configuration settings for the graph, as described in the next two sections.

The chart control appears as an Unbound Object Frame, because the chart frame contains information that comes from another program, Microsoft Graph. The chart control is unbound because it's not connected to the records in a table or query.

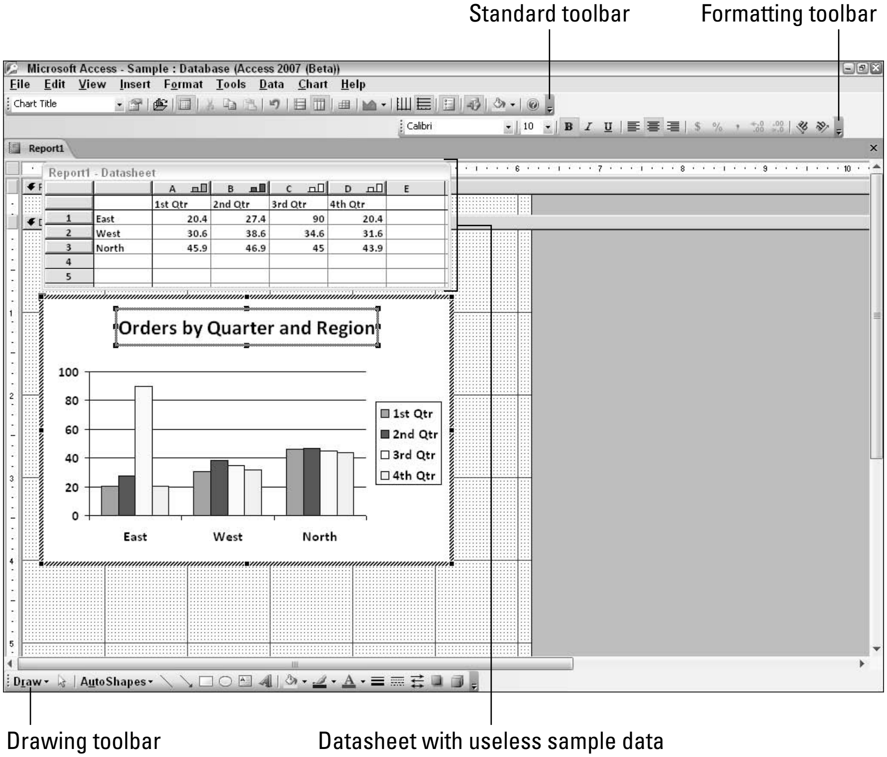
3. **Double-click the chart control to start the Microsoft Graph program.**

   When Microsoft Graph is running, the chart control appears with a hatched line around it, as shown in Figure 3-15.

   Three new (actually *old*) toolbars appear: the Microsoft Graph Standard, Formatting, and Drawing toolbars. Your Microsoft Access Ribbon goes away and is replaced by the Microsoft Graph menus and toolbars. The next two sections describe what some of the buttons on these toolbars do.

   Inexplicably, Microsoft Graph also displays a datasheet containing the sample data it uses to make the graph that appears in Design view. Editing this sample data changes the chart in Design view; however — and this is important — editing the sample data has absolutely no effect on the real chart that appears in Print Preview (or on the data in the database).

   Click the View button to get rid of the datasheet, which just clutters up the screen.



Standard toolbar

Formatting toolbar

Drawing toolbar

Datasheet with useless sample data

Microsoft Access - Sample : Database (Access 2007 (Beta))
File Edit View Insert Format Tools Data Chart Help
Chart Title
Calibri
10
Report1
Report1 - Datasheet
Orders by Quarter and Region
100
80
60
40
20
0
East
West
North
1st Qtr
2nd Qtr
3rd Qtr
4th Qtr
Draw
AutoShapes

Report1 - Datasheet

		A	B	C	D	E
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	
1	East	20.4	27.4	90	20.4	
2	West	30.6	38.6	34.6	31.6	
3	North	45.9	46.9	45	43.9	
4						
5						

Figure 3-15: Microsoft Graph is running, although you may not know it.

4. **Make changes to your chart, as described in the next three sections.**

   The next three sections explain how to change colors, legends, titles, fields, and chart type.

5. **Exit Microsoft Graph by clicking in the Design View window, outside the chart control.**

   The extra toolbars disappear, the funny border around the control disappears, and you are back in Access.

6. **Click the View or Print Preview button to see how your graph looks now.**

Repeat these steps until you have the chart the way you want it. When you save the report that contains the chart control, you save the changes to the control, too.

The next three sections describe changes you can make to your chart. You make some of these changes in the Property sheet for the chart control, some using buttons on the various Microsoft Graph toolbars, and some by giving commands while Microsoft Graph is running. (Don't worry — we let you know when to do what.)

Formatting charts with colors, legends, and titles

The Chart Options dialog box, shown in Figure 3-16, enables you to change the titles, axis labels, gridlines, legends, data labels (which appear on the graph itself), and data table placement. To display it, first double-click the chart control in the Design View window to get Microsoft Graph up and running, and then choose Chart➪Chart Options from the main menu.

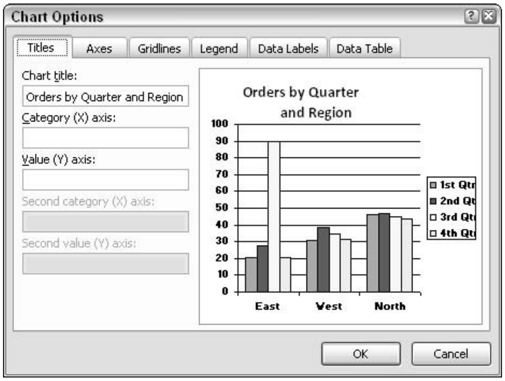


Chart title: Orders by Quarter and Region

Category (X) axis:

Value (Y) axis:

Second category (X) axis:

Second value (Y) axis:

Figure 3-16: The Chart Options dialog box contains lots of formatting settings for your graph.

Some other ways you can format your graph when Microsoft Graph is running (that is, when the chart control has a hatched border) are the following:

- **Background color:** Click a part of the graph and then click the down arrow to the right of the Fill Color button on the Standard toolbar and choose a color. You can also right-click the plot area (the graph itself) or a blank part of the chart and choose the Format Chart/Plot Area option from the shortcut menu that appears.
- **Gridlines:** To add or remove gridlines within the chart, click the Category Axis Gridlines and Value Axis Gridlines buttons on the Standard toolbar.
- **Title:** To change the title that appears on the graph, just double-click the title and edit the text. Move the title by selecting it (with one click) and dragging. You can also change the font by right-clicking it and choosing the Format Chart Title option from the shortcut menu that appears.
- **Legends:** To display or remove the legend — the table that explains the meanings of the colors or symbols in the graph — click the Legend button on the Standard toolbar. Move the legend by dragging it to a new location within the chart control. Change the fonts by double-clicking the legend to display the Format Legend Entry dialog box.
- **Data table:** Click the Data Table button on the Standard toolbar to add a table to the chart showing the data used in the table.

You can choose how the border of the graph looks by setting the following options. These options are available only when you've selected the chart control but have not yet double-clicked the control to get Microsoft Graph up and running:

- **Border:** To set the color of the border, click the down arrow to the right of the Line/Border Color button on the Formatting toolbar and choose a color. Then set the width of the border by clicking the down arrow to the right of the Line/Border Width button.
- **3-D effect:** You can give the edge of the chart a raised, sunken, or 3-D shadow effect by clicking the down arrow to the right of the Special Effect button on the Formatting toolbar and selecting the look you like.

Changing how the data is graphed

You can modify what type of chart you get and what data it shows, but you have to get Microsoft Graph up and running again before you start scrambling things around.

Just double-click the chart control in Design view to call up Microsoft Graph.

- **Type of chart:** If you want to switch from a bar chart to a line chart, from one kind of bar chart to another kind of bar chart, or if you want to make one of the types of charts that the Chart Wizard doesn't even know about, click the down arrow to the right of the Chart Type button and choose a different type of chart. For more options, choose Chart➪Chart Type from the main menu, or right-click the chart control and choose the Chart Type option from the shortcut menu that appears.
- **Axes:** Because Microsoft Graph treats your data as if it were stored in a spreadsheet — graphing the data row by row or column by column — switching which field is represented along which axis of the chart is pretty easy. To see other ways of representing your data on the same type of graph, just click the By Row and By Column buttons on the Standard toolbar.

  Save your chart first, in case you don't like the results. Switching your chart back to its original format is not always easy.
- **Trendline:** If your graph shows information over time (a Date/Time field is shown along one axis), you can add a *trendline* that shows the general direction of growth or decline in the numbers. Choose Chart➪Add Trendline.

Changing which data is charted

If you want to change the fields included in the chart, you can change the Row Source setting of the chart control. Display the Property sheet for the chart control by single-clicking (not double-clicking) the chart control in the Design View window and clicking the Property Sheet button. (Microsoft Graph can't be running when you do this; to exit Microsoft Graph, click in the Design View window outside the chart control.)

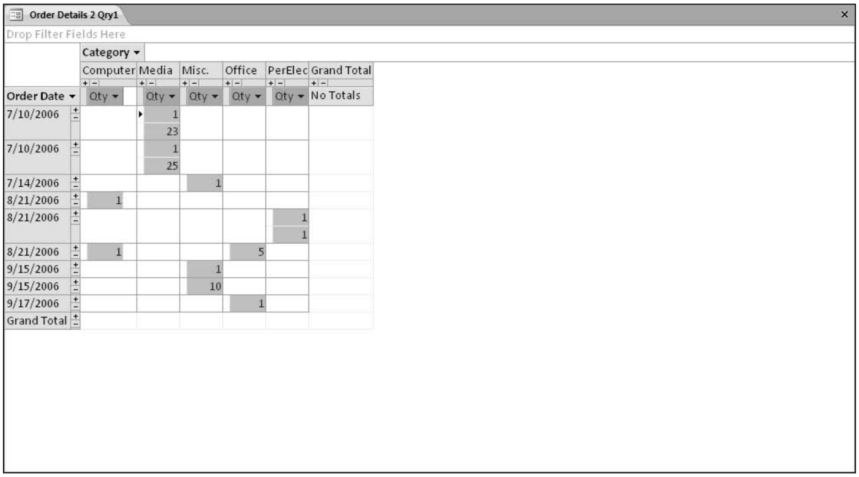
The Row Source setting (on the Property sheet Data tab) may contain an SQL statement that describes the fields to be graphed. (See Book VIII, Chapter 5 for information about SQL.) You can change the statement by clicking in the Row Source setting and then clicking the Build button to its right. Set the Row Source Type setting to Table/Query, then click in the Row Source setting to see the Build button. You see the SQL Query Builder window, which looks just like the Design View window when creating queries. Each column in the QBE grid corresponds to a field in the graph, although the exact number and use of the columns depends on the type of the chart.

If you make changes to the QBE grid, Access asks whether you want to save your changes when you close the window. (Or press Ctrl+S or click the Save button on the Quick Access toolbar before closing the window.) When you switch the report containing the chart control to Print Preview, you see the results of your changes.

Access 2007 doesn't provide a handy Build button for changing your data source. Instead, you set the Row Source Type property of the chart object to the Table/Query setting, and the Row Source property to a table or query in your database.

Analyzing Your Data Graphically with PivotCharts

A PivotChart, like a PivotTable, is an interactive tool that helps you analyze your data, selecting and summarizing your data by the fields that you designate. Both PivotTables and PivotCharts cross-tabulate records in a table or query, but a PivotTable presents the results as text while a PivotChart graphs the results. Unlike a regular chart, you can instantly make changes to a PivotChart by dragging field names to the chart or choosing from drop-down lists that reflect your data. Figure 3-17 shows a PivotTable that analyzes orders for Computers, Media, Miscellaneous, Office Supplies, and Personal Electronics by month. Figure 3-18 shows the same information as a chart. The beauty of PivotCharts is that you don't have to create a whole bunch of different charts to show different types of data. Instead, create one flexible PivotChart that can be tweaked to show whatever you're interested in seeing at the moment. (PivotCharts were new in Access 2002.)



Order Details 2 Qry1

Drop Filter Fields Here

Category

Order Date	Computer	Media	Misc.	Office	PerElec	Grand Total
	Qty	Qty	Qty	Qty	Qty	No Totals
7/10/2006		1 23				
7/10/2006		1 25				
7/14/2006			1			
8/21/2006	1					
8/21/2006					1 1	
8/21/2006	1			5		
9/15/2006			1			
9/15/2006			10			
9/17/2006				1		
Grand Total						

Figure 3-17: A PivotTable analyzes your data and shows it as text.

You can read all about PivotTables in Book III, Chapter 4.

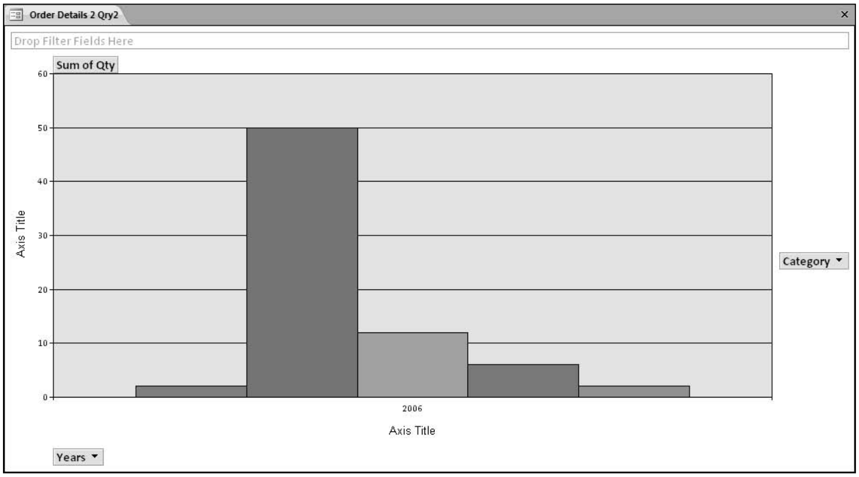


Figure 3-18: When you view a PivotTable as a PivotChart, Access uses the same fields that you specified for the PivotTable.

Creating PivotCharts

You can display the information from any table, query, or PivotTable as a PivotChart. When you create a PivotChart, you modify the layout of a table or query.

To create a PivotChart from any table or query, follow these steps:

1. **In the Navigation Pane, double-click the table or query on which you want to base the PivotChart.**

   The new PivotChart opens.

2. **Right-click the table's (or query's) Title tab and then select PivotChart View.**

   Access creates a new layout and a control containing the PivotChart. The Chart Field list also appears, showing the fields from the table or query on which the PivotChart is based, as shown in Figure 3-19. A new set of tools also appears on the Ribbon: the PivotChart tools.

3. **Specify what's on your chart by dragging fields from the Chart Field list to the PivotChart drop areas.**

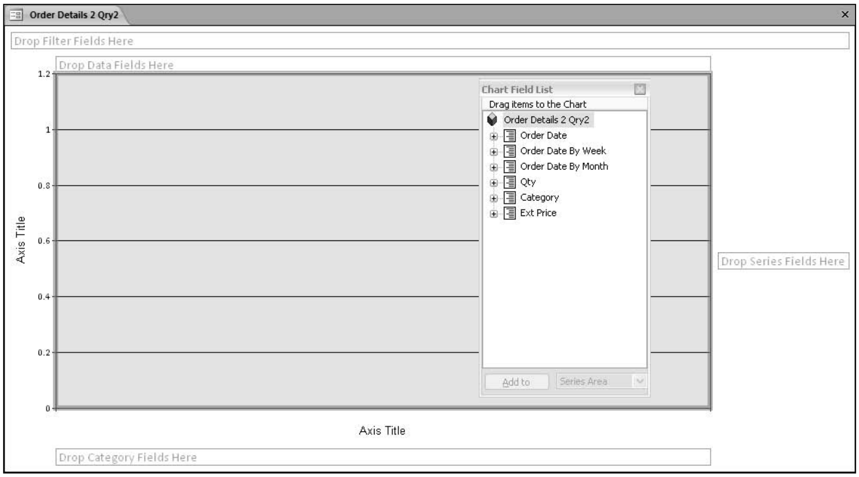


Figure 3-19: You create a PivotChart by dragging fields to the blank chart.

Field List

If the Chart Field list doesn't appear, click the Field List button on the Show/Hide chunk of the Design tab on the Ribbon. The Chart Field list is like the Field list that appears when you edit a form: It lists the fields you have available to drag to the PivotChart.

The PivotChart drop areas are

- **Filter fields:** Fields you want to use to filter the data shown in the chart. To filter the data, click the drop-down list and click to remove check marks — only checked data is included in the chart. This drop area works like the Criteria row in an Access query.

- **Data fields**: Fields containing the data you want to chart (for example, the numbers that are represented by the heights of the bars of a bar chart). The values of these fields are measured by the numbers on the Y-axis.
- **Category fields:** Fields that contain values that you want to run along the bottom edge (X-axis) of the chart.
- **Series fields:** Different values in these fields are represented by different lines in a line chart, different bars in a bar chart, or different colored graph elements. To display legends for the series, click the Legend button on the Show/Hide chunk of the PivotChart Ribbon. If you want a stacked or clustered bar chart, a line graph with more than one line, or a multi-ring doughnut chart, drag more than one field to the Series drop area.

4. **Make changes to the type of chart, which fields are graphed, and which values of each field are included.**

   See the section, "Sprucing up your PivotCharts," at the end of this chapter, for details.

5. **To see the chart better, close the Chart Field list by clicking its X button.**

   You can always open it again if you want to add more fields: Right-click in the PivotChart and choose the Field List option from the shortcut menu that appears.

Saving and viewing your PivotChart

Like PivotTables, a PivotChart is a special view of an Access object (tables and queries have pivot views available to them, too). When you close a PivotChart, Access asks if you want to save the changes to the layout of the query or table. When you close a PivotChart view of a table or query, Access just saves the information as part of the table or query. You can save your changes while editing a PivotChart by clicking the Save button on the Quick Access toolbar or pressing Ctrl+S.

To open a PivotChart again, open its table or query by double-clicking it in the Navigation Pane. Then right-click the Title tab of the open table or query and choose PivotChart View. Access displays the PivotChart view of your table or query. The Title tab of the PivotChart View window shows the name of the table or query that provides the record source for the chart.

You can switch to other views by right-clicking the Title tab of the table or query and choosing one of the following: Design View, SQL View (if you have a query open), Datasheet View, PivotTable View, and PivotChart View. Switching to PivotTable view shows the same information as rows and columns of text. Switching to Datasheet or Design views is usually pointless, though — you see only the datasheet or design of the underlying table or query.

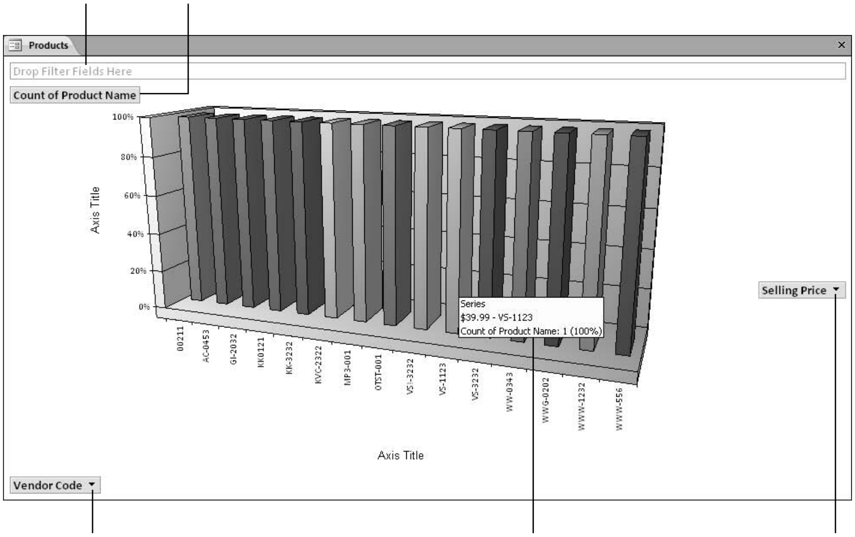
Sprucing up your PivotCharts

After you create a PivotChart, you can change the type of chart, which fields appear where, and which values are included. As you make your changes, Access redraws the PivotChart immediately — unlike the charts made by Microsoft Graph, an Access PivotChart doesn't make you switch views to see your results.

Another dynamic aspect of PivotCharts is that you can see what each part of the chart means by simply hovering the mouse pointer over it. Figure 3-20 shows a chart of the products that an online video and CD store sells, with a bar for each vendor from which the product is purchased. When you point to a section of the stacked bar chart shown in Figure 3-20, Access displays a pop-up box with the values that make up that bar, along with its numeric value .

Filter records

Count of Product Name field



Vendor Code field

Detail of selected item

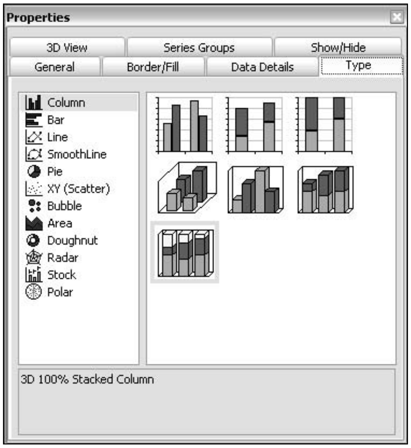
Selling Price field

Figure 3-20: The parts of a PivotChart.

The following list details some changes you can make to your PivotChart with it open in PivotChart view:

Change Chart Type

- **Changing chart type:** If you don't want a bar chart (the default chart type), change the chart type by clicking the Change Chart Type button on the Design tab on the Ribbon. Or right-click a blank place on the chart and choose the Change Chart Type option from the shortcut menu that appears. Either way, you see the Properties sheet for the PivotChart with the Type tab selected, as shown in Figure 3-21. Click a type from the list at the left, and then a format from the examples shown.



3D 100% Stacked Column

Figure 3-21: Change the type of chart from the Properties sheet for a PivotChart.

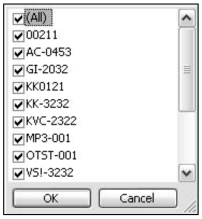
Field List

- **Changing which fields are graphed:** For each field on the PivotChart, you see a gray button with a downward-pointing triangle — a *field button*. Figure 3-20 shows buttons for the `Count of Product Name`, `Vendor Code`, and `Selling Price` fields. You can change or add the fields to the graph. Display the Chart Field list by clicking the Field List button on the Design tab on the Ribbon. Then drag a field from the Chart Field list to one of the drop areas. (Turn to the "Creating PivotCharts" section, earlier in this chapter, if you need a refresher on drop areas.) You can have more than one field in each of the drop areas. To remove a field from a drop area, drag it anywhere outside the PivotChart window.

Switch Row/Column

- **Switching data and series fields:** You can switch the Data and Series fields (the fields shown along the X-axis and the fields shown by colors or symbols) by clicking the Switch Row/Column button on the Active Field group of the Design tab on the Ribbon. Click the button again to switch back.

- **Changing which values are included:** When you click a field button on the PivotChart (for example, the `Vendor Code` or `Selling Price` buttons in Figure 3-20), the button expands into a list of the values for that field (as shown in Figure 3-22). The field button(s) at the top-left corner of the chart are for fields that don't appear on the chart, but which are used to filter the records included. In the list of values, you can clear the check box for any value that you don't want included in the chart.



☑ (All)
☑ 00211
☑ AC-0453
☑ GI-2032
☑ KK0121
☑ KK-3232
☑ KVC-2322
☑ MP3-001
☑ OTST-001
☑ VSI-3232

Figure 3-22: Click a field's button on the PivotChart to see a list of values to include in the chart.

Legend

- **Displaying or hiding legends:** Click the Legend button on the Design tab on the Ribbon to display or hide the legend that shows the meanings of the colors and symbols on the chart.
- **Changing other properties:** Click an item in the PivotChart and click the Property Sheet button on the Tools group of the Design tab on the Ribbon to see the Property sheet for that item. You can set the colors and borders of the bars, the background color, gridlines, fonts, and other settings.

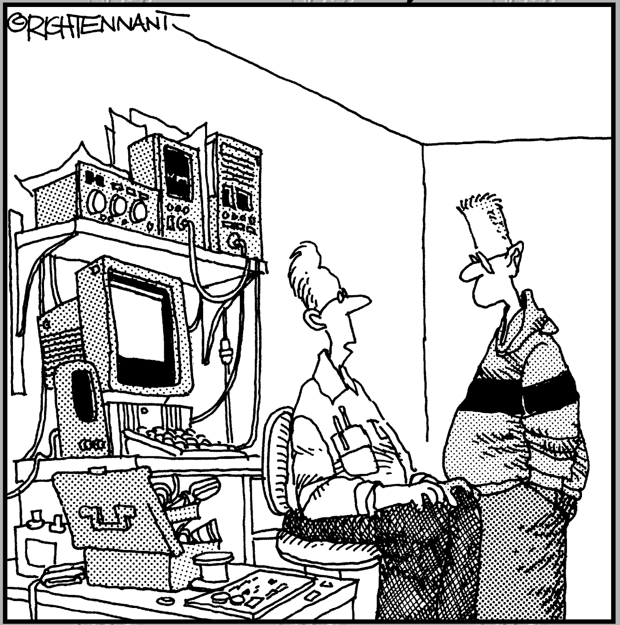
TIP

Another way to change which fields are on the PivotChart, which values are included, and how they are arranged is to switch to PivotTable view (right-click the Title tab and choose PivotTable View) and make your changes there. When you switch back to PivotChart view, the same data is included in the chart.

Book VI

Macros: Automating Stuff in Access

The 5th Wave By Rich Tennant



"I couldn't get this 'job skills' program to work on my PC, so I replaced the motherboard, upgraded the BIOS and wrote a program that links it to my personal database. It told me I wasn't technically inclined and should pursue a career in sales."

Contents at a Glance

Chapter 1: Making Macros Do the Work

In This Chapter

- What macros do
- Creating a macro
- Macro actions and arguments
- Running macros
- Making your forms smarter with macros

Access is a pretty smart program. Throughout the program are thousands of nice little features that make Access so intelligent, such as validation rules and formats that allow Access to help you keep your data neat and tidy. However, sometimes you want Access to be even smarter. You may want to format a field in a way Access doesn't allow. Or you may want your form to include a command button that the Command Button Wizard doesn't make. No problem — you can make Access even smarter by writing your own programs within Access.

Strangely, Access includes two (count 'em) ways of putting a program together: macros and VBA. The differences between the two are

- **Macros** are the original Access do-it-yourself program makers, dating back to the Dawn of Access (1991). However, Microsoft is phasing out macros, and suggests that you not use them for any major programming tasks.
- **Visual Basic for Applications (VBA)** is the newer create-a-program-in-Access programming language. VBA is a version of Visual Basic that works with all the programs in Microsoft Office. Microsoft recommends VBA for all significant programs. We describe VBA in detail in Book VIII.

So why use macros at all? Here's why: If you want to do something small and simple, making a little macro is a piece of cake (as you find out in this chapter). And you can always convert the macro to VBA later with the Access conversion command.

What Is a Macro?

A *macro* is a list of actions that happen when you run the macro. (That's a general definition that works for almost any programming language, actually.) For example, you may have a macro that performs these actions when you click a button on a form:

1. Saves the current record.
2. Prompts you to put a blank mailing label in the printer.
3. Prints a report, filtering the records to include only those that match the record currently displayed on the form.

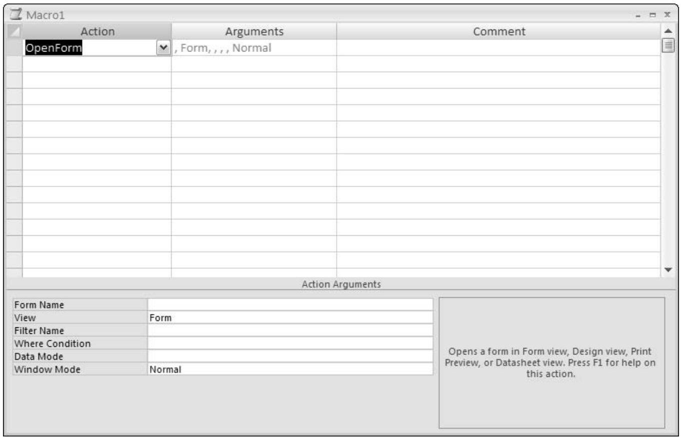
Most macros are short and sweet, like this example. For more complex programs, you need VBA.

Creating and Editing Macros

Creating a macro is easy:

1. **Click the New Object button in the Other group of the Create tab on the Ribbon (you may need to click its down arrow if the button says Module or Class Module).**

   Access displays the Macro window, in which you enter the actions that make up the macro. Figure 1-1 shows a macro with one action already entered.



Action	Arguments	Comment
OpenForm	, Form, , , , Normal	

Action Arguments

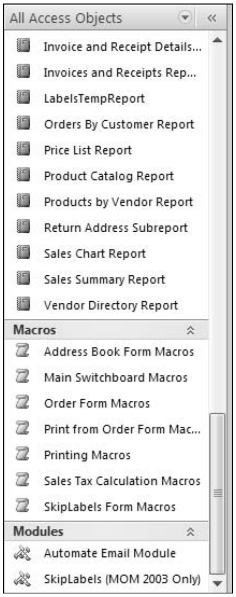
Form Name	
View	Form
Filter Name	
Where Condition	
Data Mode	
Window Mode	Normal

Opens a form in Form view, Design view, Print Preview, or Datasheet view. Press F1 for help on this action.

Figure 1-1: You use the Macro window to create and edit macros.

The upper part of the Macro window shows the list of actions, with space for a comment after each action. The Action Arguments part of the window shows the arguments — additional information that Access needs to perform the action — of the currently selected action.

Press F11 if the Navigation Pane isn't visible. Access shows you the macros that already exist (you may have to scroll down to see the Macros section) in the database, as shown in Figure 1-2.



All Access Objects

- Invoice and Receipt Details...
- Invoices and Receipts Rep...
- LabelsTempReport
- Orders By Customer Report
- Price List Report
- Product Catalog Report
- Products by Vendor Report
- Return Address Subreport
- Sales Chart Report
- Sales Summary Report
- Vendor Directory Report

Macros

- Address Book Form Macros
- Main Switchboard Macros
- Order Form Macros
- Print from Order Form Mac...
- Printing Macros
- Sales Tax Calculation Macros
- SkipLabels Form Macros

Modules

- Automate Email Module
- SkipLabels (MOM 2003 Only)

Figure 1-2: The Navigation Pane shows you the macros in your database.

2. **Enter the action that you want the macro to take in the first row of the Macro window.**

   When you click in the Action column and then click the downward-pointing button at the right side of the column, a drop-down menu appears listing all the Access macro actions. Choose the one you want. For example, choose the `OpenForm` action to display a form on-screen, or the `SetValue` action to set a field or control to a specific value. The next section lists many useful actions.

   After you choose an action, a description of the action appears in the lower-right part of the Macro window. Access also displays the arguments of that action in the lower half of the Macro window — the Action Arguments pane.

3. **For each action, specify the arguments for that action in the Action Arguments pane.**

   Click in each box in turn and set the value of the argument. For some arguments you type a value, and for others you can choose from a list. If a downward-pointing triangle button appears at the right end of the box, click it to see a drop-down menu of your options.

4. **Repeat Steps 2 and 3 for each action you want the macro to take.**

   When you run the macro, Access executes the actions you specified, starting on the first row of the macro and proceeding until Access reaches a blank row.

Taking action!

To tell Access what to do when running the macro, you specify actions and arguments to actions. Access provides you with 56 actions that you can use in your macros. Table 1-1 lists the most commonly used actions.

Table 1-1 Macro Actions

Action	*Comments*
`Apply Filter`	Applies a filter to the records in a datasheet, form, or report. Set the `Filter Name` argument to the name of an existing query or type an SQL `WHERE` statement as the `Where Condition` argument.
`Beep`	Beeps. (You were perhaps expecting it to do something else?)
`Close`	Closes an Access object. Set the `Object Type` to `Query`, `Form`, `Report`, or other object. Set the `Object Name` to the specific object you want to close. Set `Save` to specify whether to save any changes.
`FindNext`	Repeats the last search you performed. (Perfect for a Find Next button on a form!)
`FindRecord`	Searches the current datasheet or form for the record you specify in the `Find What` and other arguments.
`GoToControl`	Moves the focus (cursor) to the control you specify in the `Control Name` argument. Useful on forms.
`MsgBox`	Displays a message box with the text you specify in the `Message` argument.
`OpenDataAccessPage`	Opens a page in Browse or Design view.
`OpenForm`	Opens a form in Form or Design view or in Print Preview. You specify the `Form Name`. The `Filter Name` and `Where Condition` arguments let you filter the records that appear in the form.

Action	*Comments*
`OpenQuery`	Opens a query in Datasheet or Design view or Print Preview.
`OpenReport`	Opens a report in Design or Print Preview, or just prints the report, depending on what you specify for the View argument. The `Filter Name` and `Where Condition` arguments let you filter the records that appear in the report.
`OpenTable`	Opens a table in Datasheet or Design view or in Print Preview.
`OutputTo`	Exports the data from the specified object to an Excel spreadsheet file, Rich Text Document (RTF), text file, Web page (HTML), or Snapshot Report.
`PrintOut`	Prints the object that you specify. You can specify the page range and the number of copies to print.
`ReQuery`	Recalculates the value of the current control, or reruns the record source query.
`RunApp`	Runs another program. The `Command Line` argument specifies the program name.
`RunCode`	Runs a VBA function. (See Book VIII.)
`RunCommand`	Runs an Access menu command. You specify the command by choosing from a long list.
`RunMacro`	Runs another macro. When the other macro finishes running, the first macro continues with the next action.
`Save`	Saves the object that you specify.
`SelectObject`	Selects the object that you specify.
`SendKeys`	Types the keystrokes that you specify in the `Keystrokes` argument, as if you were typing the keystrokes in the current application.
`SetValue`	Sets the value of a control, field, or property to the value you specify (which can be an expression).
`ShowAllRecords`	Removes any filter from the current table, query, or form.

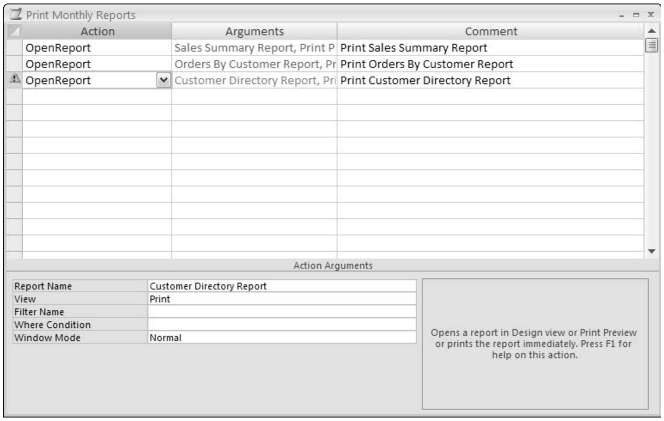
Specifying arguments to actions

After you select an action, Access displays its arguments in the Action Arguments pane of the Macro window (refer to Figure 1-1). Click in an argument's box to set it. Pressing F6 switches between the list of actions in the top part of the Macro window and the Action Arguments pane.

When you click in the box for an argument, Access displays information about that argument in a box on the right side of the Action Arguments pane.

Some arguments start out blank, while others start with a default value. For example, the OpenForm action has a View argument that specifies which view you want the form to appear in. The default value for the View argument is Form view (you usually want forms to open in Form view).

For example, Figure 1-3 shows a macro that prints three reports. The macro contains three OpenReport actions. Each OpenReport action has the Report Name argument set to a different report — three reports that print at the end of each month. For each action, the View argument is set to the Print mode, which prints the report rather than displaying it on-screen. Running the macro prints the three reports. Note, however, that only the action arguments for the currently selected action are visible in the window. You only see the action arguments for the third macro action in Figure 1-3.



Action	Arguments	Comment
OpenReport	Sales Summary Report, Print P	Print Sales Summary Report
OpenReport	Orders By Customer Report, Pr	Print Orders By Customer Report
OpenReport	Customer Directory Report, Pri	Print Customer Directory Report

Report Name	Customer Directory Report
View	Print
Filter Name	
Where Condition	
Window Mode	Normal

Opens a report in Design view or Print Preview or prints the report immediately. Press F1 for help on this action.

Figure 1-3: This macro prints three reports, one after the other.

These arguments appear in many macro actions:

- **View:** What view Access opens the object in. For example, the OpenForm action includes the View argument, and you can choose the Form, Design, Print Preview, Datasheet, PivotTable, PivotChart, or Layout arguments from a drop-down menu — all the possible views for a form.
- **Object Type:** Type of object. Access provides a drop-down menu from which you choose the Table, Query, Form, Report, Macro, Modules, Data Access Page, Server View, Diagram, Stored Procedure, or Function objects.
- **Object Name:** Name of the object (table, query, form, report, macro, modules, or data access page) the action affects. Choose the Object

Type argument first, and Access provides a drop-down menu of the objects of that type. For example, the Close action uses this argument to tell Access what to close.

- **Filter Name:** Name of a query (or filter saved as a query) that specifies which records to include in the action.
- **Where Condition:** Expression that specifies which records to include. Click the Build button to the right of the argument to display the Expression Builder.

Naming, saving, and editing macros

Before you run a macro, you need to save it with a name. Press Ctrl+S, click the Save button on the Quick Access toolbar, or click the Close button and click the Yes button to save the macro. The Save As dialog box appears the first time you save a macro. Name the macro and click OK.

You can edit your macro by right-clicking the macro name and choosing the Design View option from the shortcut menu that appears. You see the Macro window again, with the name of the macro appearing in the title bar of the Macro window. (In Figure 1-3, the macro is called Print Monthly Reports.)

In the Macro window, you can change actions and arguments as described in the preceding sections. You can also insert rows if you need to add macro actions in the middle of a macro: Click the Insert Row button in the Rows group of the Macro Tools tab on the Ribbon to add a row above the current row. You can delete a row by clicking the gray box at the left of the row to select the row, and then pressing the Delete key.

Adding comments

You can type anything you like in the Comment column in the Macro window. We usually explain what each action is supposed to do. You can also leave a blank row or two at the top of the macro, with no actions in the rows, and type the name and purpose of the macro in the Comment column.

Storing macros in related groups

Because most macros are short — frequently only one or two actions — storing them in groups is efficient. We like to store all the macros used for each form in one macro group. To create a macro group, follow these steps:

1. **Create a new macro by clicking the New Object: Macros button in the Other group of the Create tab.**

   You see the Macro window.

2. **Press Ctrl+S or click the Save button on the toolbar to save your new, blank macro group. Type a name for the group and click OK.**

   For example, if these macros run from the Purchase Order form, name the group something like *Purchase Order Form*. So far, this macro looks just like a single macro, not like a macro group, but stay tuned!

3. **Click the Macro Names button in the Show/Hide group of the Macro Tools tab on the Ribbon.**

   Access adds a column to the Macro window: the Macro Name column. This new column provides a place to specify the names of the individual macros in the group.

4. **For the first macro you want to store in the group, type the name in the Macro Name column.**

   For example, if you're writing a macro to print the current purchase order, type **Print** in the Macro Name column. The full name of the macro is the group name followed by a dot and the macro name. Your macro may end up with the name `Purchase Order Form.Print`.

5. **Enter the macro's actions and arguments as usual, using as many rows as you need.**

6. **For the next macro you want to store in the group, type the name in the Macro Name column on the next row.**

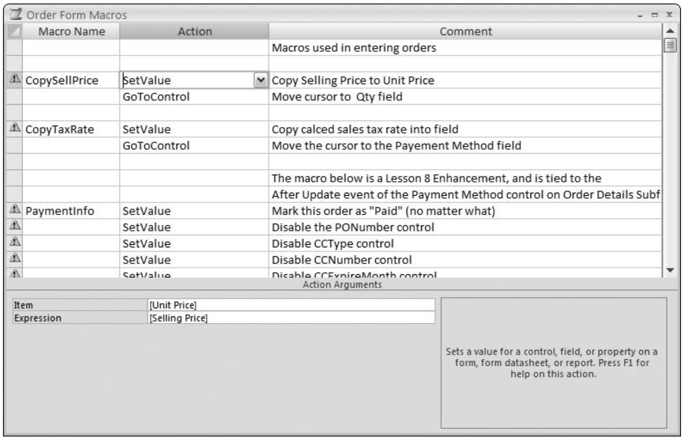
   For readability, you can leave a blank row between one macro and the next, but you don't need to. Each macro starts on the line where its name appears and ends on the line just before the next macro's name appears.

7. **Enter the next macro's actions and arguments as usual.**

8. **Repeat Steps 6 and 7 for all the macros in the group.**

9. **Save and close the macro group the same way you save and close a single macro: Press Ctrl+S or click the Save button on the Quick Access toolbar to save your changes, and click the X button to close the Macro window.**

Figure 1-4 shows a macro group that includes macros named `CopySellPrice`, `CopyTaxRate`, and `PaymentInfo`. The name of the group is `Purchase Order Form` (hmm, sounds like these macros must be used on the Purchase Order form). The full names of these macros are `Order Form Macros.CopySellPrice`, `Order Form Macros.CopyTaxRate`, and `Order Form Macros.PaymentInfo`.



Order Form Macros

	Macro Name	Action	Comment
			Macros used in entering orders
⚠	CopySellPrice	SetValue	Copy Selling Price to Unit Price
		GoToControl	Move cursor to Qty field
⚠	CopyTaxRate	SetValue	Copy calced sales tax rate into field
		GoToControl	Move the cursor to the Payement Method field
			The macro below is a Lesson 8 Enhancement, and is tied to the
			After Update event of the Payment Method control on Order Details Subf
⚠	PaymentInfo	SetValue	Mark this order as "Paid" (no matter what)
⚠		SetValue	Disable the PONumber control
⚠		SetValue	Disable CCType control
⚠		SetValue	Disable CCNumber control
⚠		SetValue	Disable CCExpireMonth control

Action Arguments

Item	[Unit Price]
Expression	[Selling Price]

Sets a value for a control, field, or property on a form, form datasheet, or report. Press F1 for help on this action.

Figure 1-4: You can store a group of macros together.

Leave a row with no action above each macro name, to separate one macro from the next. Type the name and purpose of the macro in the Comment column.

Running Macros

You can run a macro directly by right-clicking the macro in the Navigation Pane and choosing Run!. You can also run the macro by double-clicking it. If you stored a bunch of macros in a macro group, Access runs just the first macro in the group.

For example, to run the `Print Monthly Reports` macro (refer to Figure 1-3), right-click the `Print Monthly Reports` macro from the list of macros, and select Run! from the menu. Or just double-click the macro name.

The most common way to run a macro, however, is to assign it to an event on a form — for example, the `On Click` event of a command button. You specify the full name of the macro (macro group name, a dot, and the name of the individual macro) in one of the properties of a command button. But before we cover macros with forms (later in this chapter), you can run macros in two other cool ways: auto-execution when the database opens and execution when certain keystrokes are used.

Running a macro when the database opens

We like our databases to automatically display a Main Menu form, or some other commonly used form, as soon as the database opens. If the first thing you usually do after opening the database is to open the Order Entry form, why not tell Access to open it for you? You may have other actions you'd like Access to take when your database opens — you may want to prompt the user for his or her name, or display a list of reports.

In order to tell Access to do something automatically when the database opens, you can write a macro with the actions you want Access to take, and then tell Access to run the macro on startup.

Running a macro when the database opens is a snap: Just name the macro `AutoExec`. That's the whole thing. When you open a database, Access looks in the database for a macro named `AutoExec`, and if there is one, Access runs the macro. Enter the actions and arguments for the `AutoExec` macro in the usual way — in the Macro window.

TIP

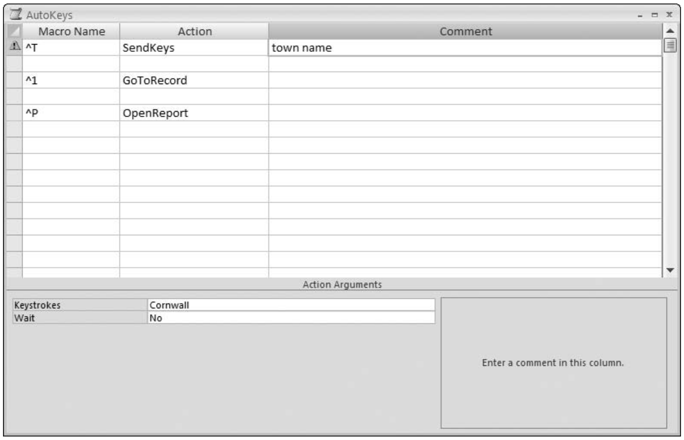
If you *don't* want the `AutoExec` macro to run when you open the database, hold down the Shift key while the database is loading.

Assigning macros to keys

Your database can contain a *key-assignment macro* — a macro that assigns keys on the keyboard to run macros. If you create a macro group named `AutoKeys`, and it contains macros with the names of keys (or key combinations) on the keyboard, then Access runs the appropriate macro when you press the key. Figure 1-5 shows an `AutoKeys` macro with macros assigned to Ctrl+T, Ctrl+1, and Ctrl+P.

To name a key-assignment macro, use ^ to indicate the Ctrl key, + for the Shift key, and { } around key names that are more than one letter long. Table 1-2 shows the names of the keys you can use: You're restricted to letters, numbers, Insert, Delete, and the function keys, used in conjunction with the Shift and Ctrl keys. A few examples of key-assignment macros are the following:

- `^G`: means Ctrl+G
- `+{F2}`: means Shift+F2
- `{INS}`: means the Insert key



Macro Name	Action	Comment
^T	SendKeys	town name
^1	GoToRecord	
^P	OpenReport	

Keystrokes	Cornwall
Wait	No

Enter a comment in this column.

Figure 1-5: An `AutoKeys` macro group assigns macros to keystrokes.

Table 1-2	**Key Names in AutoKeys**
Key Name	***Key***
`A`	A letter key (ditto for the rest of the letter and number keys)
`{F1}`	F1 function key (ditto for the rest of the function keys)
`{INS}`	Insert or Ins key
`{DEL}`	Delete or Del key

If you assign a macro to a key that normally does something else (such as Ctrl+F, which usually summons the Find and Replace dialog box), your macro overrides the Access command.

Opening Databases That Contain Macros

Access 2007 has a new feature to guard against databases that contain viruses in the form of macros. Unfortunately, this feature also guards against normal databases that contain macros, action queries, and VBA procedures. When you open a database that contains one of these types of objects, you may see a dialog box asking whether you really want to take a chance on running the macros in the database. You can choose whether to open the database with the macros enabled. (See Book I, Chapter 2 for details.)

Can a macro be a virus?

Writing a virus is no small feat, and requires pretty advanced programming skills. In order to qualify as a virus, the macro has to be intentionally written to do bad things to your computer, and to replicate itself. Writing code that does harmful things is not easy. If you're concerned that you may accidentally create a virus, you can stop worrying about that. Creating a virus by accident is about as likely as writing an entire book, or driving across country, by accident.

If the database is something you created yourself, then it's absolutely, positively, 100 percent safe to enable the macros. You have three options:

- Put up with the annoying security warning message every time you open the database, and choose the Enable Content button each time.
- Set your Access Trust Center Macro Settings to Enable all macros, so Access never notifies you when you open a database that may contain viruses. See the section, "Turning down your Access security settings," later in this chapter.
- *Digitally sign* your database by adding the security code that tells Access, "It's okay, this is my own database, and I can vouch for its safety." This digital signature works only when you open the database on your own computer. The next section describes how to sign your database.

TIP

We recommend this last option: you don't have to put up with annoying messages, and you don't want to open up your Access program to viruses from other people.

Signing your database

Signing a database for your own use is easy to do. First you create your own digital signature, and then you use it to sign your databases. This signature works only on your own computer: When other people open your database, they still see the security warning message. If you want to create a digital signature that works everywhere, then you need to contact a certification authority and buy one.

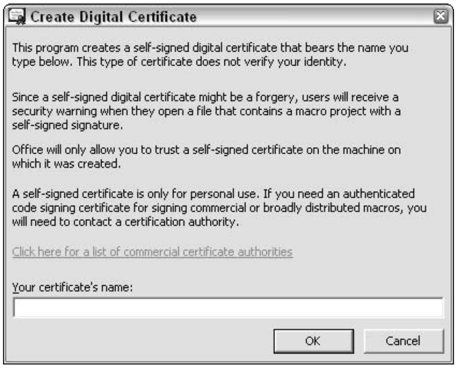
Follow these steps to create a digital signature for use on your own computer:

1. **Choose Start➪Programs➪Microsoft Office➪Microsoft Office Tools➪ Digital Certificate For VBA Projects.**

   Windows prompts you to install this program, unless you've used it before.

2. **Follow the prompts to install Digital Signature For VBA Projects.**

   You probably need your Microsoft Office CD. When the program is installed you see the window shown in Figure 1-6.



Create Digital Certificate

This program creates a self-signed digital certificate that bears the name you type below. This type of certificate does not verify your identity.

Since a self-signed digital certificate might be a forgery, users will receive a security warning when they open a file that contains a macro project with a self-signed signature.

Office will only allow you to trust a self-signed certificate on the machine on which it was created.

A self-signed certificate is only for personal use. If you need an authenticated code signing certificate for signing commercial or broadly distributed macros, you will need to contact a certification authority.

Click here for a list of commercial certificate authorities

Your certificate's name:

Figure 1-6: Creating a digital signature for use with your own databases.

3. **Type a name for your certificate (such as your own name) and click OK.**

   The program reports that it created a certificate, or digital signature.

4. **Click OK.**

If you plan to distribute your database to other people and you need a certificate that works on computers other than yours, you need to buy a digital certificate. See the VeriSign Web site:

```
www.verisign.com/products/signing
```

After you have a digital certificate, sign your database with the following steps:

1. **With your database open, click the Database Tools tab of the Ribbon and click the Visual Basic button on the Macro group (or press Alt+F11).**

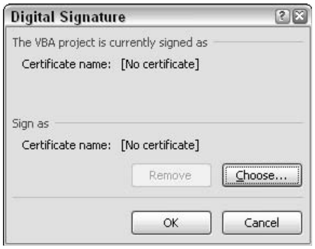
   You see the Microsoft Visual Basic window, which is described in Book VIII, Chapter 1.

2. **Choose Tools➪Digital Signature.**

   You see the Digital Signature dialog box shown in Figure 1-7.

3. **Click the Choose button and choose from a list of the digital signature certificates stored on your computer. Click OK twice.**

4. **Choose File➪Close and Return to Microsoft Office Access.**


Digital Signature

The VBA project is currently signed as

Certificate name: [No certificate]

Sign as

Certificate name: [No certificate]

Figure 1-7: You can add your own digital signature to your database.

Now, when you open your own database, Access doesn't complain. Whew!

Turning down your Access security setting

If you don't expect to open any database that you or your trusted associates didn't create, you can tell Access not to warn you about any databases. Follow these steps:

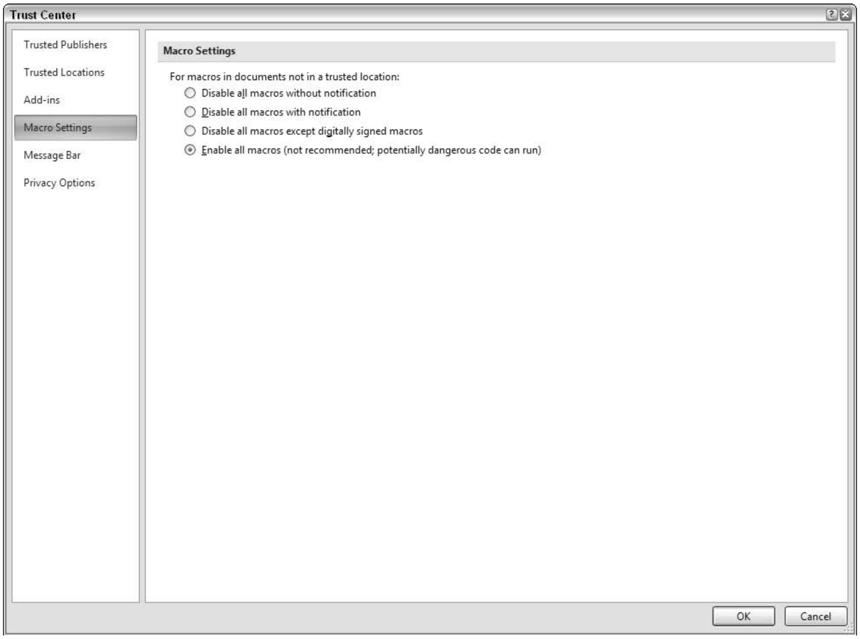
1. **From the Microsoft Office Button menu, choose Access Options.**

   You see the Access Options dialog box.

2. **Click Trust Center in the left pane of the Access Options dialog box.**

3. **Click the Trust Center Settings button in the right pane of the Access Options dialog box.**

4. **Click Macro Settings in the left pane, then select the *Enable all macros (not recommended, potentially dangerous code can run)* radio button, as shown in Figure 1-8.**



Macro Settings

For macros in documents not in a trusted location:

○ Disable all macros without notification
○ Disable all macros with notification
○ Disable all macros except digitally signed macros
● Enable all macros (not recommended; potentially dangerous code can run)

Figure 1-8: Options for handling macro security in all Access databases.

5. **Click OK twice.**

Access no longer displays warning messages when you open databases that contain macros.

Attaching Macros to Forms

Most macros are used with forms — to make form controls smarter or to power command buttons. Every control in a form has events connected to it — things that happen when the user clicks the control. You can tell Access to run a macro when an event happens.

Events are properties of the control. To tell Access to run a macro when the event happens (for example, any time the value of a field changes or a command button is clicked), you enter the macro name in the event property for the control or for the whole form. Follow these steps:

1. **Create and save the macro you want to run.**

   You can store the macro by itself, or as part of a macro group. (We usually create one macro group for each form, and store all the macros for that form in the group.) Save the macro before continuing. (But you can keep the Macro window open if you plan to make further changes to your macro.)

2. **Open the form in Design view.**

   Refer to Book IV, Chapter 2 for how to edit a form in Design view.

Property Sheet

3. **Display the Property sheet by clicking the Property Sheet button on the Tools group of the Design tab on the Ribbon. Click the Event tab.**

   See Book IV, Chapter 1 for information about the Property sheet. The Event tab displays all the events for the selected object.

4. **If you're attaching a macro to a control (such as a command button), click that control. If you want to attach the macro to the form itself, click the box where the rulers intersect in the upper-left corner of the form.**

   Now the Property sheet shows the available events for the form or control.

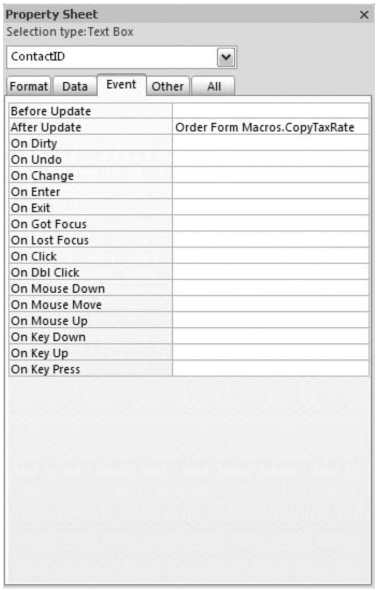
5. **Click in the event property you want to use.**

   For example, if you're attaching a macro to a command button, click in the `On Click` property to run the macro when the user clicks the command button. If you want the macro to run whenever you insert a record using the form, click in the `Before Insert` property.

6. **Click the downward-pointing arrow at the right end of the property and choose the name of the macro.**

   Access lists all the individual macros as well as macros in groups, in alphabetical order. For example, if the `Order Form Macros` macro group contains a macro named `AddRecord`, choose `Order Form Macros.AddRecord`.

Most controls have a number of different events to which you can assign a macro, including when your cursor enters and exits the control, when you click or double-click it, or when its value changes. Figure 1-9 shows the Event tab of the Property sheet for a textbox control, with a macro name in the `After Update` event property of a combo box.



Property Sheet
Selection type: Text Box

ContactID

Before Update	
After Update	Order Form Macros.CopyTaxRate
On Dirty	
On Undo	
On Change	
On Enter	
On Exit	
On Got Focus	
On Lost Focus	
On Click	
On Dbl Click	
On Mouse Down	
On Mouse Move	
On Mouse Up	
On Key Down	
On Key Up	
On Key Press	

Figure 1-9: The Event properties of a combo-box control on a form.

Table 1-3 shows the most commonly used events that can happen to controls in a form.

Table 1-3 Some Form Control Events

Event	*Description*
`Before Update`	When the control or record is about to be updated
`After Update`	Immediately after the control or record is updated
`On Not in List`	When a user tries to enter a value in combo and list boxes that's not in the list of values
`On Enter`	When focus (cursor) moves to the control
`On Exit`	When focus (cursor) leaves the control
`On Click`	When you click the control
`On Dbl Click`	When you double-click the control

For example, you can make a macro for an order form that automatically moves you to the last record in the table. (You rarely want to edit the oldest order in the table, but you more likely want to continue editing the newest order.) The macro runs when you open the form. The macro, which we named `LastRecord` and stored in our `Order Form Macros` macro group, is

Action	*Arguments*
`GoToRecord`	`Record: Last`

To make the macro run each time you open the form, set the form's `OnOpen` event property to the name of the macro, `Order Form Macros.LastRecord`.

Creating command buttons on forms

Book IV, Chapter 3 describes how to make command buttons on a form. The Command Button Wizard can write VBA procedures for many tasks that you may want a button to do, such as going to the first or last record, applying a filter, or finding a record. However, you may want a command button to do something that the wizard doesn't know how to do. In that case, you have to write your own macro or VBA procedure and link it to an Event property of the command button. (Book VIII explains how to write VBA.)

For example, if you want to make a button that prints three end-of-month reports, you use the Button (Form Control) button in the Controls group of the Design tab on the Ribbon to create a new command button control and then set its `On Click` event to the name of the macro you created for printing those three reports.

Referring to form controls in macros

When you write a macro that runs from a form, the macro has to refer frequently to the current value of a control on the form. In the arguments you use to specify macro actions, you can just type the name of the control that displays either the field or the field name. For example, to set the shipping charge to three dollars per item, you use this macro:

Action	*Arguments*
`SetValue`	`Item: [Shipping & Handling]Expression: [Total Qty] * 3`

However, if you're referring to a control on a form other than the form from which the macro was called, you need to specify which form the control is on, such as

```
[Forms]![formname]![controlname]
```

Replace *`formname`* with the name of your form and *`controlname`* with the name of the control on the form.

For example, the `OpenReport` action displays or prints a report. You can use its `Where Condition` argument to restrict the records that appear in the report. If you want the report to include only records with the same `Order No` value as the order displayed on the Orders form, you type this value in the `Where Condition` argument of the `OpenReport` action:

```
[Order No] = [Forms]![Orders]![Order No]
```

In the `Where Condition` argument of many actions (an argument you use to filter records), you must always use this longer version of the name of the control you want to refer to.

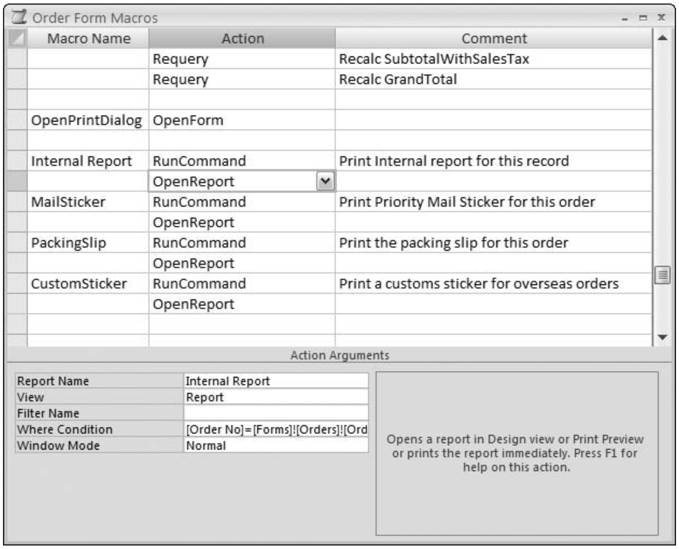
Printing matching records from a form

Now you know everything to create a very useful command button: a button that prints a report for the record displayed in the form. For example, an order form may have an Internal Report button to print an internal report, a Mailing Label button to print the Mailing Label report, and an Invoice/Receipt button to print the Invoice or Receipt report — all filtered to include only the order that is currently displayed in the form. Put all these macros into a macro group for the form (for example, the `Order Form` macro group).

The `Internal Report` macro saves any changes made to the current record on the form, and then prints the `Internal Report` for the current record:

Action	*Arguments*
`RunCommand`	`SaveRecord`
`OpenReport`	`Report Name: Internal ReportView: PrintWhere Condition: [Order No] = [Forms]![Orders]![Order No]`

For each macro, you create a button that calls the macro via the button's `On Click` property. Figure 1-10 shows the Property sheet for the `InternalReport` command button.



Order Form Macros

Macro Name	Action	Comment
	Requery	Recalc SubtotalWithSalesTax
	Requery	Recalc GrandTotal
OpenPrintDialog	OpenForm	
Internal Report	RunCommand	Print Internal report for this record
	OpenReport	
MailSticker	RunCommand	Print Priority Mail Sticker for this order
	OpenReport	
PackingSlip	RunCommand	Print the packing slip for this order
	OpenReport	
CustomSticker	RunCommand	Print a customs sticker for overseas orders
	OpenReport	

Action Arguments

Report Name	Internal Report
View	Report
Filter Name	
Where Condition	[Order No]=[Forms]![Orders]![Ord
Window Mode	Normal

Opens a report in Design view or Print Preview or prints the report immediately. Press F1 for help on this action.

Figure 1-10: Macros that print a report for only the order currently displayed on the order form.

Chapter 2: Making Macros Smarter

In This Chapter

- **Making macros run conditionally**
- **Changing form control properties with a macro**
- **Creating your own switchboard or main menu form**

While macros are simple and powerful, they aren't the full-featured programming language that VBA is. (We want to repeat this bit of practical advice: For writing programs of any size, use VBA, not macros.) This chapter describes some nifty ways to use macros with your forms, including how to create a "Mission Control" or switchboard form for your database.

If you create a macro and decide later that you wish you'd written a VBA procedure to do the job, Access can convert the macro to VBA. See Book VIII, Chapter 1 for how to convert a macro to a VBA program. If you want to use the Access built-in switchboards rather than regular forms, see Book IV, Chapter 3.

Only Run This If I Say So

Every programming language worth its salt has an if-then feature, which ensures that a command is only carried out under specific circumstances. For instance, you may want Access to print a report for the current order only if the order number isn't blank: If the order number *is* blank, don't print the report and if the order number *isn't* blank, then do print the report. The technical term for such an if-then situation is *conditional execution*.

If-then macros

The way you add a condition to a macro action is by adding a Condition column to the Macro window and then typing a condition into the column. Follow these steps:

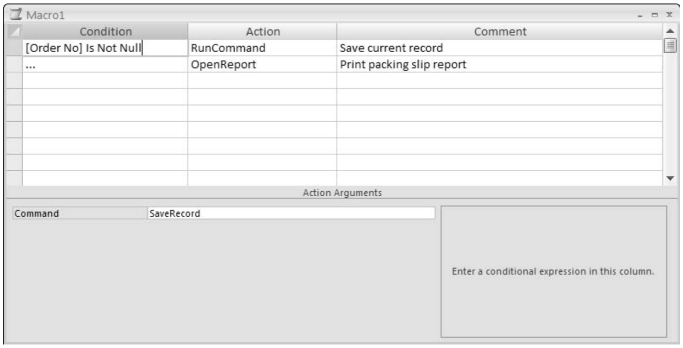
1. **Display the Navigation Pane (by pressing F11), scroll to the Macros section in the Object list, right-click your macro in the list of macro names, and select the Design View.**

   You see the Macro window with your macro, ready to edit. (See Chapter 1 of this minibook for how the Macro window works.)

2. **Click the Conditions button on the Show/Hide group of the Design tab on the Ribbon, or right-click the title of the Macro window and choose Conditions to add a Condition column to the Macro window.**

   Conditions

   The Condition column appears to the left of the Action column, as shown in Figure 2-1.



Macro1

Condition	Action	Comment
[Order No] Is Not Null	RunCommand	Save current record
...	OpenReport	Print packing slip report

Action Arguments

Command: SaveRecord

Enter a conditional expression in this column.

Figure 2-1: The Condition column in the Macro window is where you type in a condition that controls whether Access performs an action.

3. **Enter actions and arguments.**

   Click in the Action column, click the downward-pointing triangle button at the right side of the Action box, and choose the action from the drop-down list. Then enter the arguments for the action in the Action Arguments pane in the lower half of the Macro window.

4. **When you get to a conditional action, type the condition into the Condition column.**

   For example, you may want to print a report for the current order (using the `OpenReport` action), but you don't want to print a blank report if no order is displayed. You use the `[Order No] Is Not Null` condition to specify that Access performs the action only if an order number appears on the form.

   For the condition, you can use any expression that comes out to be either `True` (`Yes`) or `False` (`No`). Conditions work just like the criteria that you use when creating queries, as described in Book III, Chapter 1. You can compare values using comparison operators such as `=`, `<`, and `>`, and you can use `Is Null` and `Is Not Null` to spot (respectively) blank and non-blank values.

5. **If you want to perform several actions based on the same condition, type the condition in the Condition column on the row for the first action, and type . . . (three periods) in the Condition column for the other actions.**

   The `. . .` condition means "use the condition from the preceding row."

For example, the following macro (the same one shown in Figure 2-1) saves the current record and prints a report with records that match the current record but only if the current record isn't blank:

Condition	*Action*	*Arguments*
`[Order No] Is Not Null`	`RunCommand`	`Command: SaveRecordNull`
`...`	`OpenReport`	`Report Name: Packing SlipView: PrintWhere Condition: [Order No] =[Forms]![Orders]![Order No]`

On the first line, the `RunCommand` action only happens if the `Order No` control isn't blank (null). On the second line, the `. . .` condition means to use the same condition for this line, too — only print the report if the order number isn't blank. (Otherwise, you would get a blank report!)

In the second row of the macro, the `OpenReport` action prints the `Packing Slip` report, printing only the records for the current order. The `Where Condition` argument makes the selection, comparing the `Order No` control in the record source for the report to `[Forms]![Orders].[Order No]`, the Order No control on the Orders form. (This long and confusing way of referring to a control on a form is described near the end of Chapter 1 of this minibook.)

If-then-else macros

If you want an if-then-else condition — you want to run one set of actions if the condition is True and another set if the condition is False — you use the StopMacro action. Your macro looks like this:

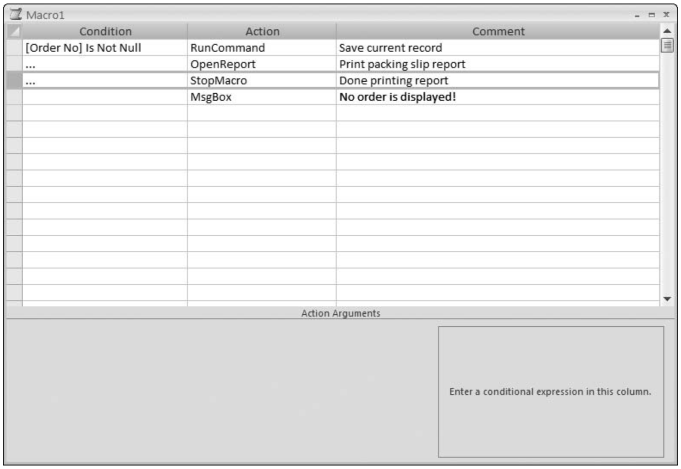
Condition	Action	Arguments
condition	*action*	
. . .	action	
. . .	StopMacro	Ends the macro execution
	action	

On the first line, you enter the condition and the first command to run if that condition is True. On the following lines, enter . . . (three periods) as the condition and choose the additional actions that you want to happen when the condition is True. On the line after the final action that happens when the condition is True, enter . . . (three periods) for the condition and StopMacro for the action. This line tells the macro to stop executing, but Access only runs this action if the condition is True. On the following lines, leave the condition blank and enter the actions that happen if the condition is False.

When you run an if-then-else macro, Access checks whether the condition is True. If it is, Access runs the actions, line by line, until it reaches the StopMacro action, and then stops. If the condition is False, Access skips down to the first line that has a blank condition, and starts executing there.

For example, the macro shown in Figure 2-2 prints a report if the Order No condition isn't blank, and displays a message if it is:

Condition	Action	Arguments
[Order No] Is Not Null	RunCommand	Command: SaveRecord
...	OpenReport	Report Name: Packing SlipView: PrintWhere Condition: [Order No] =[Forms]![Orders]![Order No]
...	StopMacro	
	MsgBox	Message: Order No. is blankBeep: Yes



Condition	Action	Comment
[Order No] Is Not Null	RunCommand	Save current record
...	OpenReport	Print packing slip report
...	StopMacro	Done printing report
	MsgBox	No order is displayed!

Enter a conditional expression in this column.

Figure 2-2: An if-then-else macro does one set of actions if a condition is True, and another set if the condition is False.

Changing the Way Your Form Looks Dynamically

A *really* smart form changes in response to the information you type into it. Making smart forms isn't hard: You need only know how to make a macro display, hide, enable, and/or disable controls on the form in response to what you enter.

Setting the properties of form controls

Macros have no problem changing the values of controls — a macro can copy a value from one control to another, for example, or store a calculation in a control. But that's not all. Macros can also change the properties of controls, in essence changing how controls look or act on-screen. The following properties, for example, are all eminently changeable once a macro gets its hands on them:

✦ `Fore Color`: We're guessing `Fore Color` is short for "Foreground Color." In any event, `Fore Color` refers to the text color property of a label. Changing the `Fore Color` property makes the text appear in a different color. Why is this neat? A macro can change the color of a label to, say, bright red based on whether an order is paid for or not, which makes tracking down deadbeats much easier for you.

- Visible: If the Visible property is set to No, the control is hidden. You can have a macro make controls invisible based on the values of other controls. For example, if an order is paid by check, the credit card controls aren't needed and can be hidden.
- Enabled: If the Enabled property is set to No, the cursor won't move to it, and you can't change the control's value. You can make a macro that sets the value of some controls and then disables them so that the value can't be changed.

Follow these steps to add an action to a macro that changes the properties of a form control:

1. **Open your macro in the Macro window. (Right-click the macro in the Navigation Pane and select DesignView.)**

   If you want to create a new macro instead of adding to an existing macro, click the Macro button on the Other group of the Design tab on the Ribbon.

Conditions

2. **Display the Condition column if you want to make your action conditional by clicking the Conditions button on the Show/Hide group of the Design tab on the Ribbon.**

   In Figure 2-3, the macro hides a label if a control is blank (null) and displays the label if the control isn't blank.

3. **In the Condition column, type the condition under which you want to change the property of the control.**

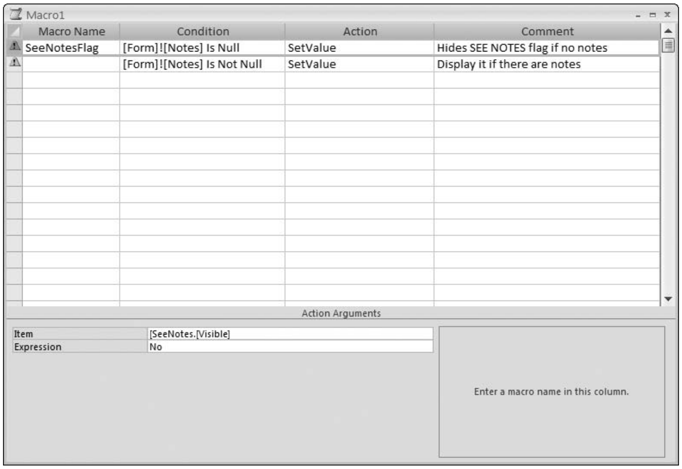
   In Figure 2-3, the condition for the first row of the macro is [Notes] Is Null. This condition means *perform this action if the Notes control on the current form is blank.*

4. **Click in the Action column, click the downward-pointing arrow at the right end of the box, and choose the SetValue action from the menu.**

   The SetValue action works for setting properties, too.

5. **In the Item argument box, type the name of the control whose property you want to set, followed by a dot and the name of the property.**

   If the control name includes spaces, enclose it in square brackets. (If there are no spaces, the square brackets can't hurt.) Access adds brackets around the property name for you. In Figure 2-3, the Item argument is [SeeNotes].[Visible] — the Visible property of the SeeNotes label.



Macro1

Macro Name	Condition	Action	Comment
SeeNotesFlag	[Form]![Notes] Is Null	SetValue	Hides SEE NOTES flag if no notes
	[Form]![Notes] Is Not Null	SetValue	Display it if there are notes

Action Arguments

Item	[SeeNotes.[Visible]
Expression	No

Enter a macro name in this column.

Figure 2-3: The SeeNotes-Flag macro changes the Visible property of the Notes field.

6. **In the Expression argument box, type the value to which you want to set the property.**

   To hide the `SeeNotes` label when the `Notes` field is empty, the macro in Figure 2-3 sets the `Visible` property to `No`.

TIP

When you set the `Item` argument of the `SetValue` action to the property you want to change, you can click the Build button to the right of the Item box to use the Expression Builder. In the Expression Builder window, delete anything in the box at the top of the window where the finished expression appears. Double-click the Forms option in the left-hand column, double-click the All Forms option (or Loaded Forms, if the form is currently open on-screen), and double-click the name of the form that contains the control. In the middle column of the Expression Builder window, click or double-click the name of the control. In the rightmost column, double-click the property. The complete expression appears in the box at the top of the window. Click OK to return to the Macro window — your new expression appears in the Item box.

TIP

By default, Microsoft Access displays only the actions that are allowed in databases that have not been trusted. Click the Show All Actions button on the Show/Hide group of the Design tab on the Ribbon to see the complete list of actions in the Action drop-down list.

Running a macro during data entry

If you want to run a macro in response to a value entered in a control, set the control's `After Update` property to run the macro: Any change in the value of the control runs the macro. The `After Update` property is on the Event tab of the Property sheet for the control.

For example, an order form may have a `PaymentMethod` combo box from which you choose Cash, Check, Purchase Order, or Credit Card. You can run a macro based on the value of the `PaymentMethod` combo box that enables the appropriate other controls: `PONo` (purchase order number), `CCNo` (credit card number), `CCMonth` (credit card expiration month), `CCYear` (credit card expiration year), and `CheckNo` (check number). The macro, which is run by the Payment Method's `After Update` property, looks like this:

Condition	*Action*	*Arguments*
	`SetValue`	`Item: [PONo].[Enabled]Expression: False`
	`SetValue`	`Item: [CCNo].[Enabled]Expression: False`
	`SetValue`	`Item: [CCMonth].[Enabled] Expression: False`
	`SetValue`	`Item: [CCYear].[Enabled] Expression: False`
	`SetValue`	`Item: [CheckNo].[Enabled]Expression: False`
`[PaymentMethod]= "PO"`	`SetValue`	`Item: [PONo].[Enabled]Expression: True`
`. . .`	`GoToControl`	`Control Name: PONo`
`[PaymentMethod]= "CC"`	`SetValue`	`Item: [CCNo].[Enabled]Expression: True`

Condition	Action	Arguments
. . .	SetValue	Item: [CCMonth]. [Enabled]Expression: True
. . .	SetValue	Item: [CCYear]. [Enabled]Expression: True
. . .	GoToControl	Control Name: CCNo
[PaymentMethod]= "CH"	SetValue	Item: [CheckNo]. [Enabled]Expression: True
. . .	GoToControl	Control Name: CheckNo

First the macro disables all the controls specific to purchase orders, credit cards, and checks. Then the macro uses the `SetValue` action to set the `Enabled` property of each of these controls to `False` (disabled). Then it enables only the appropriate controls, based on the value of the `PaymentMethod` control. For each payment type, the macro also moves the cursor to one of the enabled controls, using the `GoToControl` action.

TIP

You can also make a macro run when you move your cursor to a control (using the `On Entry` property) or when you move your cursor out of the control (the `On Exit` property).

Displaying Forms and Datasheets

Making a macro that opens another form or a table or query in Datasheet view is easy. Just use the `OpenForm`, `OpenTable`, or `OpenQuery` action in your macro. For example, you may want a button on the Access database `Orders` form that displays the `Products` form, so you can see detailed information about the products that a customer is thinking of ordering. The macro looks like this:

Action	Argument
OpenForm	Form Name: ProductsView: Form

Simple enough!

Setting Up Your Own Main Menu Form

If you create a database using an Access template (as we describe in Book I, Chapter 3), Access makes a *switchboard*, a form with bunches of buttons for opening forms and printing reports. (See Figure 2-4.) You can make your own main menu form by creating an *unbound form* (a form with no record source) with command buttons that run macros. For some commands, you can use the Command Button Wizard to write VBA code instead of having to write a macro. Here's the sequence:

1. **As the next few sections explain, create the main menu form.**
2. **Create the `AutoExec` macro so Access displays the form automatically when you open the database.**
3. **Create each command button that you want on the main menu form.**
4. **For command buttons that do something that the Command Button Wizard doesn't offer, write a macro for the command button to run (and create a macro group to store these macros in).**

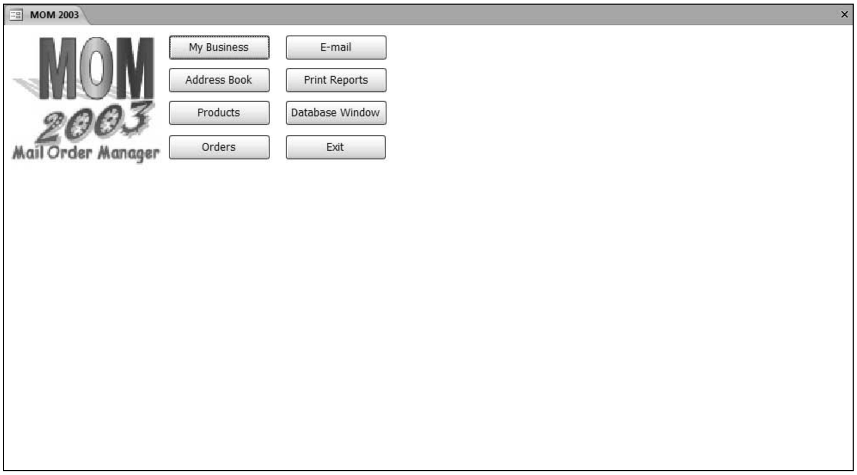


Figure 2-4: A completed custom switchboard.

Creating a form that appears when the database opens

To create an unbound form (a form with no record source) that appears when you open the database, follow these steps:

1. **Create a new form by clicking the Form Design button on the Forms group of the Create tab on the Ribbon.**

   Access opens a form in Design view.

2. **Save the form by clicking the Save button on the Quick Access toolbar or by pressing Ctrl+S. In the Save As dialog box, type a name for the form and click OK.**

   Call the form something like `Main Menu`. Leave the form open — you make buttons for it in Step 11.

   Now you are ready to make the `AutoExec` macro that opens the form automagically.

3. **Click to display the Create tab on the Ribbon.**

4. **Click the Macro button on the Other group of the Ribbon to create a new macro.**

   A blank macro appears in the Macro window.

5. **Choose the `OpenForm` action from the drop-down menu in the first row of the Action column of the Macro window.**

6. **In the Action Arguments section of the Macro window, set the `Form Name` argument for the `OpenForm` action to the name of the form you just created.**

   You click in the `Form Name` argument, click the down-arrow button, and choose the form from the list that appears.

7. **Close the macro, click the Yes button to save it, and name it `AutoExec`.**

   You have to name your macro `AutoExec` if you want the macro to run automatically each time you open the database.

8. **Click the Macro button on the Other group of the Create tab on the Ribbon to make another macro.**

   Your main menu form needs a macro group for the macros.

   A blank macro appears in the Macro window.

9. **Click the Macro Names button on the Show/Hide group of the Design tab on the Ribbon.**

   The Macro Name column appears in the Macro window, which enables you to give each macro in the group a name.

10. **Click the Save button or press Ctrl+S to save the new macro group, type a name for the macro group, and click OK.**

    You don't *have* to name the macro group with the same name as the switchboard form — but you'll find yourself less confused if you do! If you took our advice in Step 2, name the macro group `Main Menu` or `Main Menu Form`.

    Now you are ready to return to your main menu form (the one you created back in Step 1 — remember?) and add command buttons.

11. **Click in the Design View window for the form (you may have to move or minimize the Macro window), and click the Design tab of the Ribbon so that the Controls group is visible.**
12. **Click the Label (Form Control) button in the Toolbox.**
13. **Click and drag in the upper-left corner of the form to create the label box. Type a title for the form: We suggest the name of the database.**

    `Main Menu` is also an appropriate title for this form — use whatever text makes the function of the form clear. Format the title any way you want (how about large and centered?).

The form is ready and appears when you open the database — all it needs is buttons!

Creating command buttons for your main menu form

For each button you want on the main menu form, create a command button and (if necessary) a macro for it to run. When you create a command button, the Command Button Wizard writes VBA procedures to open forms, print reports, and run queries. The most useful Command Button Wizard choices for buttons on a main menu form are

- **Open Form** (in the Form Operations category): Opens any other form.
- **Preview Report** (in the Report Operations category): Opens a report in Print Preview.
- **Print Report** (in the Report Operations category): Prints a report without previewing it.
- **Run Query** (in the Miscellaneous category): Runs an action query or opens a select query in Datasheet view.
- **Run Macro** (in the Miscellaneous category): Runs a macro. The macro needs to exist before you create the command button.

If you want to do something else, you need to create a macro in your macro group and then tell the command button to run it. The next two sections describe both ways to make a command button — letting the Command Button Wizard write a VBA procedure for your button, or writing your own macro for your button.

Letting the wizard make your command button

If the Command Button Wizard knows how to write the VBA procedure for your button, use the wizard. Open your main menu form in Design view, and follow these steps:

1. **Click the Button (Form Control) button on the Controls group of the Design tab on the Ribbon and then click the form where you want the button to appear.**

   Access starts the Command Button Wizard. (See Book IV, Chapter 2 for the details.)

2. **Look in the categories and actions that the wizard offers for the action that you want the button to do. Choose the category and the action and click Next.**

   Depending on which action you choose, the wizard asks for specific information about what you want to do. For example, if you choose Open Form for the action, the wizard asks which form you want to open — and whether you want it to display all or specific records.

3. **Answer the wizard's questions about what form you want to display, what report you want to preview or print, or what query you want to open or run. Click Next.**

4. **When the wizard asks what the button should look like, click Text or Picture and specify the text or icon to appear on the button. Click Next.**

5. **Type a short name for the command button. Choose a name that has something to do with what the button does, and then click Finish.**

   The wizard creates the command button and sets the button's `On Click` property to execute the VBA code it just wrote. This property causes Access to run the VBA procedure when someone clicks the command button.

6. **Move or resize the command button as you like and create a label to go next to it.**

   If the button displays text, it may not need a label.

The Command Button Wizard sets the `On Click` property of each command button to a VBA procedure that it writes. In the Property sheet, you see `Event Procedure` in the property, which means that this event runs a VBA procedure rather than a macro; click the Build button to see the VBA code. (See Book VIII for what the code means and how to change it.)

If you want to change the button to run a macro, you can click in the `On Click` property on the Event tab of the Property sheet, click the down-arrow button for the property, and choose your macro from the list that appears.

TIP

If you're not sure whether the Command Button Wizard can write a VBA procedure for the task you want the button to perform, run the wizard according to the preceding steps to find out. In Step 2, browse through the various programs that the wizard knows how to write. If you don't see the program you need, cancel the wizard and try the steps in the next section of this chapter.

Making command buttons that run your macros

You ran the Command Button Wizard, but couldn't find the VBA program you need — the wizard just doesn't do everything. Instead, you can create a button and then write a macro for the button to run.

If you followed the steps in the section, "Creating a form that appears when the database opens," earlier in this chapter, you already created a macro group for the macros run by command buttons on your main menu form. Follow these steps for each command button that runs a macro:

1. **Open the macro group in the Macro window by right-clicking the macro name in the Navigation Pane and selecting Design View.**

   The Macro window opens, showing the macro group in which you store the macro for your new command button. If you already created macros for this form, this macro group already contains macros. No problem! Just skip down to the first blank row in the Macro window. (Or skip down an extra row or two, to leave some blank space between one macro and the next.)

   TIP

   If the Macro Name column doesn't appear in the Macro window, click the Macro Names button on the Show/Hide group of the Design tab on the Ribbon to display the column.

2. **Type a macro name in the Macro Name column — we suggest typing the name of the command button that will run this macro.**

   For example, if the Print Packing Slip command button will run this macro, why not name it Print Packing Slip, too?

3. **Create the macro by choosing the actions and entering the arguments.**

   Chapter 1 of this minibook describes how to choose the actions and arguments for a macro.

4. **Save the macro group by pressing Ctrl+S or clicking the Save button on the Quick Access toolbar.**

   You can't assign the macro name to the command button's `On Click` property if the macro isn't saved.

5. **Switch to the form's Design View window.**

   If your main menu form isn't open in Design view, open it now. (In the Navigation Pane, right-click the form name, and select Design View.)

6. **Click the Button (Form Control) button on the Controls group of the Design tab on the Ribbon and then click the form where you want the button to appear.**

   Access starts the Command Button Wizard.

7. **Choose the Miscellaneous category and the `RunMacro` action. Click Next.**

8. **When the wizard asks which macro you want to run, choose the macro name from the list. Click Next.**

   The macro name is `macrogroup.macroname`. For example, if the macro group is named `Main Menu` and the macro name is `OrderForm`, choose `Main Menu.OrderForm`.

9. **Click Text or Picture and specify the text or icon to appear on the button. Click Next.**

10. **Type a short name that has something to do with what the button does, and click Finish.**

    The wizard creates the command button.

11. **Move or resize the command button as you like, and create a label to go next to it.**

    If the button displays text, it may not need a label.

The Command Button Wizard writes a VBA procedure that runs the macro you specified, and sets the command button's `On Click` property to run the procedure. We think running a VBA procedure to run a macro is a little odd, but that's the way the wizard works.

If you'd rather run the macro directly (so no VBA procedure is involved), or you want to change to running a different macro, double-click the command button you just created (to display its Property sheet), click the Event tab, and set its `On Click` property to the macro you want to run.

Book VII

Database Administration

The 5th Wave

By Rich Tennant

"Your database is beyond repair, but before I tell you our backup recommendation, let me ask you a question. How many index cards do you think will fit on the walls of your computer room?"

Contents at a Glance

Chapter 1: Database Housekeeping

In This Chapter

- **Taking out the garbage (compacting your database)**
- **Backing up part or all of the database**
- **Analyzing how the objects in your database work together**
- **Loading Access add-ins**
- **Creating an ACCDE file**

An Access database can get big and complicated, with hundreds of different objects — tables, queries, forms, reports, macros, and other stuff you find out about in other parts of the book. Given this fact, you need to keep your database neat and tidy, or the file size balloons and it becomes just plain confusing to use. This chapter describes how to compact, repair, back up, analyze, and configure your database.

Compacting and Repairing Your Database

As you make changes to your database, Access stores new information in the database file and marks the old information for deletion. However, the old information isn't actually removed from your database file right away. In fact, most database files have a tendency to get larger and larger, just because Access (like most other programs) isn't very good at taking out the garbage. To shrink your database back down, you have to compact the database file.

The process of compacting a database also repairs errors that crop up in the file. Occasional Access bugs, Windows bugs, or cosmic rays from the planet Jupiter can cause objects in the database to become corrupted — or broken, if you prefer a more straightforward term. Compacting the database repairs these corrupted objects.

To compact and repair your database when the database is open, follow these steps:

1. **Close all tables, queries, forms, reports, and other database objects, including the Visual Basic Editor.**

   Access can't compact the database if objects are open.

2. **Click the Office Button. In the resulting dialog box, choose Manage➪Compact and Repair Database.**

   Access compacts the database. When the status indicator at the bottom of the Access window hits 100 percent and the mouse pointer no longer looks like an hourglass, the compacting is done. If you don't see any error messages, the compacting worked perfectly, and no repairs were needed.

WARNING!

If your computer is on a network and you suspect other people may be using your database, make sure that no one else has your database open before compacting it.

You can also compact a database that's not open. Access leaves the original database unchanged and asks you for a new filename to use for the compacted version — the original database is left as a backup. With no database open, follow these steps:

1. **Click the Office Button. In the resulting dialog box, choose Manage➪Compact and Repair Database.**

   Access displays the Database to Compact From dialog box, which looks just like an Open dialog box.

2. **Choose the name of the database you want to compact and click the Compact button.**

   The Compact Database Into dialog box, which looks just like a Save As dialog box, appears.

3. **Type a new name for the compacted database and click the Save button.**

   Access compacts the database and saves it with the new name.

Making Backups

Backing up your database is vital. If you're not sure about this, think about the amount of effort required if the database vanishes from your hard disk. Think about your boss's fury. Think about the killing boredom of typing all that information in again. Okay, you get the idea — backups are a good thing.

Ideally, you should back up your entire hard disk, or at least the files that you create or edit. (Backing up program files is usually pointless: You should have all the CDs to reinstall your programs, if need be.) A good backup system creates backup copies of all your files — perhaps all the files in the My Documents folder of your computer — on a regular basis (nightly?) on tapes, Zip disks, writable CDs, or writable DVDs.

TIP

To download Windows-compatible backup programs, go to the Microsoft Windows Marketplace site and search for Backup and Recovery.

For more information about backups, see *Troubleshooting Your PC For Dummies*, by the amazing Dan Gookin (published by Wiley Publishing, Inc.).

Backing up your database

We can't force you to make backup copies of all the files on your hard drive, but we can suggest in the strongest terms possible that you at least create regular backup copies of your Access database. Follow these steps:

1. **Make sure all the objects in your database are closed: Click the X (Close) button in the upper-right corner of all windows in your Access window except the Database window. (Clicking that particular X closes the database itself.)**

   If the Microsoft Visual Basic window is open, close that, too.

2. **Click the Office Button. In the resulting dialog box, choose Manage➪ Back Up Database.**

   You see the Save Backup As dialog box, which looks just like a Save As dialog box. In the File Name box, Access suggests a filename for the backup copy, consisting of the original filename with today's date stuck on the end — an excellent suggestion, in our opinion.

3. **Change the folder or filename if you want, and then click Save.**

   Access creates a duplicate copy of your database.

TIP

Backing up your database on the same hard disk that stores the original database is a good first step, but what if your hard disk dies? Consider backing up the database on a Zip disk or CD-R or DVD-R disc.

- To make a backup copy on a Zip disk or on another hard drive, click the Office Button within Access and choose Manage➪Back Up Database command, or use Windows Explorer (My Computer) to copy the file.
- To make a copy on a CD-R disc (recordable CD) or a DVD-R (recordable DVD), use the software that came with your CD or DVD burner. (Windows XP users can also use its CD-burning feature, which is built into Windows Explorer.)

Backing up specific objects

You may also want to back up only part of your database — maybe only a few tables contain data that changes frequently. You can export objects to another Access database for backup. The first order of business is to create a blank database to which you can export objects; then, when they have someplace to go, you can export them.

Follow these steps to create a new, blank database:

1. **Click the Office Button. In the resulting dialog box, choose Close Database or just close the Database window to close the database you're working with (if any).**

   Don't close the Access window — you still need to use Access for this task.

2. **Click the Office Button. In the resulting dialog box, choose New, press Ctrl+N, or click the New Database icon on the primary Access pane.**

   Access displays the New File task pane.

3. **Click the Blank Database link in the New section of the task pane.**

   You see the File New Database dialog box, which looks just like a Save As dialog box.

4. **Type a name for the database (how about "Backup" followed by the name of your main database?) and click the Create button.**

   Access makes the new database and opens its Database window.

5. **Close your new backup database.**

   It's ready to hold backup copies of your most important Access objects.

Now follow these steps each time you want to back up an object in your Access database:

1. **Open the database that contains the object that you want to export.**

   While you're at it, display its Database window (press F11).

2. **In the Database window, select the object that you want to export.**

   For example, click the Tables button in the All Access Objects list of the Database window and, from the list that appears in the window's right pane, click the table whose data changes the most often.

3. **Choose External Data➪Export.**

   You see the Export To dialog box. Actually, the dialog box title includes the type and name of the object you're exporting, such as Export Table Orders To.

4. **Select the name of the backup database that you created earlier and click the Export button.**

   The Export dialog box appears, as shown in Figure 1-1, listing which object is exporting and what its name is in the backup database.

5. **Edit the name that the object will have in the backup database.**

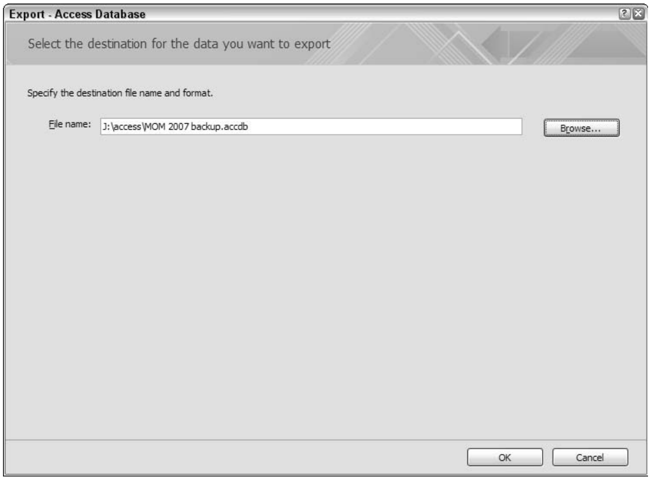
   For example, if it's Christmas Eve and you're exporting the Orders table, you may want to name it `Orders 12-24-03`. We like to use filenames that sort in chronological order, so we'd name it `Orders 03-12-24`.

6. **Choose whether to export the structure only or the data, too, if you're exporting a table.**

   Select the Definition and Data radio button if you want all the records in the table, or the Definition Only radio button if you want a blank table with no records. For backup purposes, go with the Definition and Data option.

7. **Click OK.**

   Access creates a duplicate object in the backup database with the same information stored in the current database.



Export - Access Database

Select the destination for the data you want to export

Specify the destination file name and format.

File name: J:\access\MOM 2007 backup.accdb

Figure 1-1: Exporting a table to a backup database.

Converting Databases

Access 2007 uses an entirely new file format (compared to previous versions of Access) for storing its database. Book I, Chapter 4 describes how to choose between previous file formats. See Book I, Chapter 2 for what happens when you open older Access databases in Access 2007.

You can tell what version a database is by opening it in Access and looking at the title bar of the Database window. (Press F11 if the Database window isn't visible.) The title bar may say "(Access 2000 file format)" or "(Access 2002-2003 file format)." If the title bar says nothing at all about file formats, your file is in Access 2007 format.

To convert a database from an older file format to the Access 2007 format, open the database, close all the windows except the Database window, and click the Office Button. In the resulting dialog box, choose Convert. Type a new file name for the converted database and click the Save button. Access creates a new database with all the objects in the old database, but stored in the new format.

Analyzing and Documenting Your Database

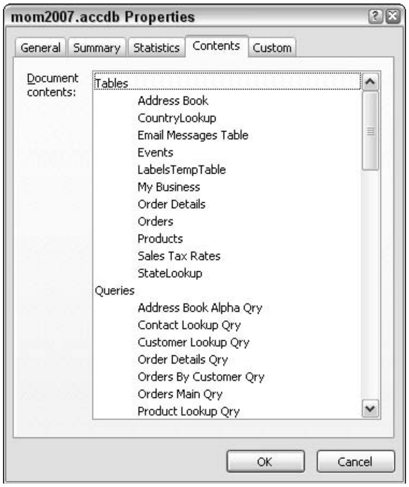
Access includes a number of commands that help you analyze your database, especially in terms of how the objects in your database connect together. The following sections detail some of them.

Viewing relationships in the Relationships window

Keeping the relationships straight between tables can be a tricky business. For help, choose the Relationships button in the Show/Hide group on the Database Tools tab of the Ribbon to display the Relationships window, which shows you how your tables connect together. For example, in an order-entry database, your Customers table has a one-to-many relationship with your Orders table, because one customer may place zero, one, or many orders. (See Book II, Chapter 6 for how to use this window — including how to move stuff around.)

Looking at a list of the objects in your database

Need a handy list of all the objects in your database? Click the Office Button. In the resulting dialog box, choose Manage⇨Database Properties to display the Properties sheet for your database. Click the Contents tab, shown in Figure 1-2, to see a list of all the objects in the database, listed by type. This list is cool, but printing is impossible.



Document contents:

Tables
- Address Book
- CountryLookup
- Email Messages Table
- Events
- LabelsTempTable
- My Business
- Order Details
- Orders
- Products
- Sales Tax Rates
- StateLookup

Queries
- Address Book Alpha Qry
- Contact Lookup Qry
- Customer Lookup Qry
- Order Details Qry
- Orders By Customer Qry
- Orders Main Qry
- Product Lookup Qry

Figure 1-2: The Contents tab in the Properties sheet for a database.

Viewing object dependencies

Access can show you a list of the tables, queries, forms, and reports that depend on an object. Say you have a query in your database that you never use, but you're not sure you can delete it because it may very well be the record source for a form or report. Access can ease your worried mind on this subject. To display the Object Dependencies task pane shown in Figure 1-3, click an object in the Database window and choose the Object Dependencies button from the Show/Hide group on the Database Tools tab of the Ribbon.

At the top of the Object Dependencies task pane is the name of the object that you're analyzing. In Figure 1-3, the object in question is Table: Address Book. (It has to be a table, query, form, or report; Access can't show the dependencies of data-access pages, macros, or VBA modules.) After each object name are two options:

- **Objects That Depend On Me:** Choosing this option lists the tables, queries, forms, and reports that use this object as a data source. The objects that depend on a table include the queries based on the table and the forms and reports that use the table as a record source. The objects that depend on a form include forms of which this is a subform.
- **Objects That I Depend On:** Choosing this option lists the tables, queries, forms, and reports that directly provide input for this object. The objects that a report depends on include the query or table that makes up its record source, as well as any reports used as subreports on this report.

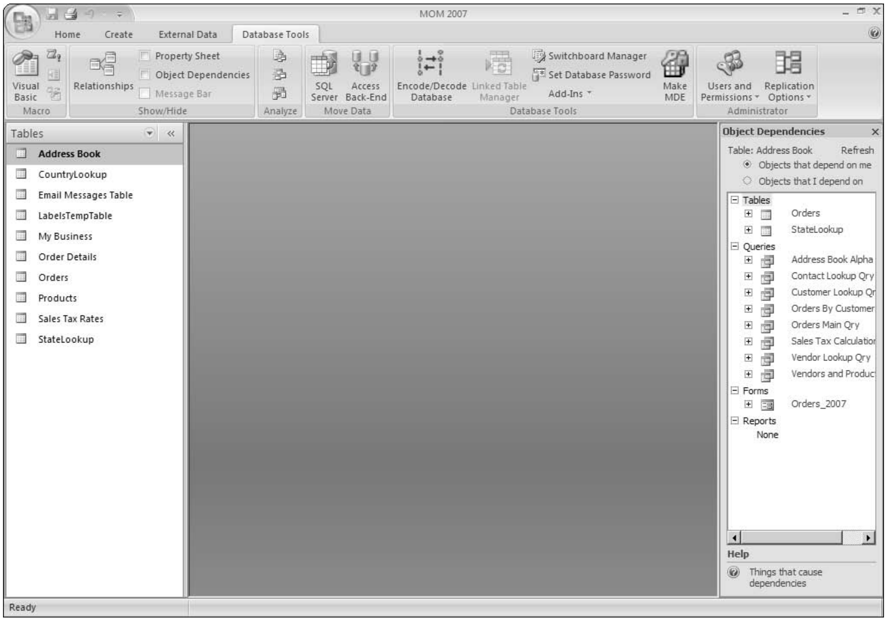


Figure 1-3: What tables, queries, forms, and reports depend on this query?

After the Object Dependencies task pane displays information about one object, you can't simply switch to another object. To see the dependencies for another object, right-click the object in the Database window and choose the Object Dependencies option from the shortcut menu. When you're done looking at object dependencies, click the X button in the upper-right corner of the Objects Dependencies task pane to make the task pane disappear.

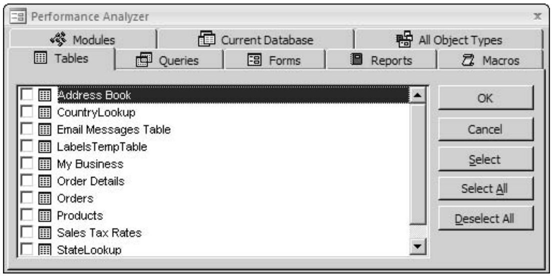
Analyzing database performance

The Performance Analyzer looks at and improves the speed and efficiency of your database, and it also suggests changes, such as shrinking unnecessarily large fields and adding indexes. Creating indexes for fields in your tables speeds up sorting and searching. (See Book II, Chapter 1 for how to create an index for a field in a table.)

To improve your database's performance, follow these steps:

1. **Open the database and then close all the objects in it — except the Database window itself.**
2. **On the Ribbon, choose Database Tools➪Analyze➪Analyze Performance.**

   You see the Performance Analyzer dialog box, shown in Figure 1-4.



□ Address Book
□ CountryLookup
□ Email Messages Table
□ LabelsTempTable
□ My Business
□ Order Details
□ Orders
□ Products
□ Sales Tax Rates
□ StateLookup

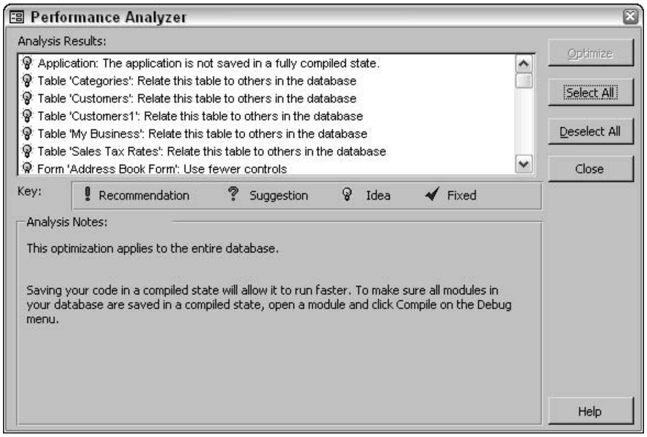
Figure 1-4: The Performance Analyzer improves your database's performance.

3. **Select the objects you want to analyze.**

   To do so, click whichever object types you want (you can choose from the Tables, Queries, Forms, Reports, Macros, or Modules tabs) and then click the check boxes next to the specific objects you want to include in the analysis. To select all the objects of a type, click the tab for the type and click the Select All button. On the Current Database tab, click the Relationships check box to ask Access to look at the relationships among your tables. If you want Access to analyze everything, click the All Object Types tab and the Select All button.

4. **Click OK to begin the analysis.**

   This may take a few minutes. When the analysis is complete, a new Performance Analyzer dialog box appears, as shown in Figure 1-5. Each result on the list is classified as a Recommendation (a change that Access recommends and can fix for you), a Suggestion (a change that may have some drawbacks, but that Access can make for you), or Idea (a change that Access can't make, but that you can make yourself). When you click a result, more information about the result appears in the lower part of the Performance Analyzer dialog box.



Application: The application is not saved in a fully compiled state.
Table 'Categories': Relate this table to others in the database
Table 'Customers': Relate this table to others in the database
Table 'Customers1': Relate this table to others in the database
Table 'My Business': Relate this table to others in the database
Table 'Sales Tax Rates': Relate this table to others in the database
Form 'Address Book Form': Use fewer controls

This optimization applies to the entire database.

Saving your code in a compiled state will allow it to run faster. To make sure all modules in your database are saved in a compiled state, open a module and click Compile on the Debug menu.

Figure 1-5: The Performance Analyzer lists its results.

5. **For each recommendation or suggestion that you want Access to fix for you, select the result and click the Optimize button.**

   Access tries to make any recommended or suggested change, and displays a message about its success or lack thereof.

6. **Make a note of the ideas that you may want to try.**

   Write down any of the ideas that you want to look into, because you can't print out the ideas, and you can't give any commands until you close the Access windows.

7. **Click the Close button to close the Performance Analyzer dialog box.**

We haven't found the Performance Analyzer's suggestions to be particularly useful, but giving it a try is worth the effort — we expect Microsoft to improve this feature in future versions of Access. The Performance Analyzer does a good job of spotting fields that should be indexed to speed up searches and sorts.

Documenting your database

You can create reports that describe the design and properties of the objects in your database. With the database open and all objects other than the Database window closed, choose Database Tools➪Analyze➪Database Documenter to open the Documenter dialog box, shown in Figure 1-6.

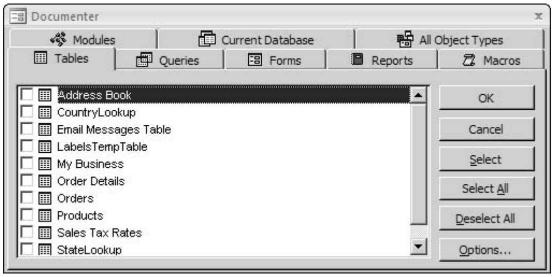


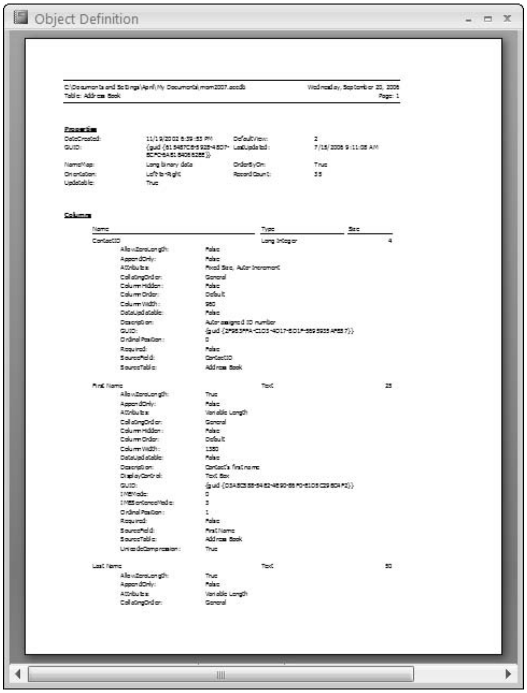
Figure 1-6: Access prints documentation about the objects in your database from the Documenter dialog box.

The Documenter dialog box works (and looks) just like the Performance Analyzer dialog box shown in Figure 1-4 — you click tabs and select check boxes to specify which objects in your database you want to document.

When you click OK, Access creates a report showing details about the properties of the object. If you select a table, the report looks similar to Figure 1-7, with information about the table itself as well as about each field (column) in the table. The report about a form or report includes the properties of all the controls in the form or report design.

TIP

Choose just one object to document at a time — the report about each document can be many pages long!



Object Definition

```
C:\Documents and Settings\April\My Documents\mom2007.accdb          Wednesday, September 20, 2006
Table: Address Book                                                                     Page: 1

Properties
DateCreated:       11/19/2002 6:39:55 PM           DefaultView:     2
GUID:              {guid {815487C8-5928-4807-      LastUpdated:     7/18/2006 9:11:05 AM
                   8CFC-6A818406E285}}
NameMap:           Long binary data                OrderByOn:       True
Orientation:       Left-to-Right                   RecordCount:     35
Updatable:         True

Columns
     Name                                          Type                 Size
     ContactID                                     Long Integer            4
          AllowZeroLength:      False
          AppendOnly:           False
          Attributes:           Fixed Size, Auto-Increment
          CollatingOrder:       General
          ColumnHidden:         False
          ColumnOrder:          Default
          ColumnWidth:          960
          DataUpdatable:        False
          Description:          Auto-assigned ID number
          GUID:                 {guid {2F983FFA-C103-4017-8D1F-8895935AF857}}
          OrdinalPosition:      0
          Required:             False
          SourceField:          ContactID
          SourceTable:          Address Book

     First Name                                    Text                   25
          AllowZeroLength:      True
          AppendOnly:           False
          Attributes:           Variable Length
          CollatingOrder:       General
          ColumnHidden:         False
          ColumnOrder:          Default
          ColumnWidth:          1380
          DataUpdatable:        False
          Description:          Contact's first name
          DisplayControl:       Text Box
          GUID:                 {guid {D3A8C588-9482-4890-88F0-8105C29804F2}}
          IMEMode:              0
          IMESentenceMode:      3
          OrdinalPosition:      1
          Required:             False
          SourceField:          First Name
          SourceTable:          Address Book
          UnicodeCompression:   True

     Last Name                                     Text                   50
          AllowZeroLength:      True
          AppendOnly:           False
          Attributes:           Variable Length
          CollatingOrder:       General
```

Figure 1-7: The Documenter's report includes the gory details about a table.

Loading and Managing Add-Ins

As with all of the programs in Microsoft Office, Access allows you to extend the functionality of Access through the use of add-ins. An *add-in* is a custom component, usually created by professional programmers. If you work in a large corporation that has an Information Technology (IT) department, programmers may create an add-in to make Access easier to use with your company's data.

Running the Add-in Manager

To use an add-in, you must first copy it to your computer's hard disk. To do that, you need the name and location of the add-in. If the add-in was created by your company's IT department, they can tell you the name and location of that add-in. After you copy the add-in to your hard drive, using the add-in is simple. Just follow these steps:

1. **Click the Add-Ins button from the Database Tools group on the Database Tools tab on the Ribbon. From the menu that appears, choose Add-In Manager.**

   The Add-in Manager dialog box appears, as shown in Figure 1-8.

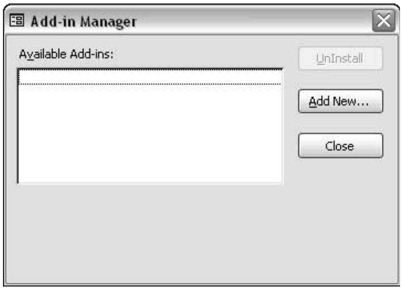


Figure 1-8: The Add-in Manager allows you to add and remove add-ins.

2. **To install an add-in, click the Add New button.**

   An Open dialog box opens.

3. **Navigate to the folder in which the add-in is stored, and then click the Open button.**

4. **Repeat Steps 2 and 3 to add as many add-ins as you wish. Then click the Close button in the Add-in Manager dialog box.**

To remove an add-in, from the Ribbon, choose Database Tools➪Database Tools➪Add-Ins➪Add-In Manager. In the Add-in Manager dialog box, select the name of the add-in you want to remove, and then click the Uninstall button.

Creating add-ins

Creating add-ins is the turf of serious programmers. Read this section if you're already a programmer — it's one big "Technical Stuff" section. This section points out the main things that you need to be aware of, such as creating wizards, custom menu items, or custom builders for Access. If you're not a programmer, skip to the next section of this chapter.

Office versus Access add-ins

Be aware that you can create two different types of add-ins. One is the Component Object Model (COM) add-in. A COM add-in works in multiple Office 2003 applications. You can write a single COM add-in to perform the same function in Access, Word, Excel, and PowerPoint. To create a COM add-in, you need to use Microsoft Visual C++, C#, J++, J#, or any of the languages available in the Microsoft Office 2003 Developer Edition. COM add-ins are dynamic link libraries (`.dll` files), and need to be registered with the operating system to allow them to be loaded by Microsoft Office 2007 applications.

The second of the two types of add-ins is the application-specific add-in, which works only in a single application, such as Microsoft Access. An Access add-in is designed only to work with Access. Access add-ins are easier to create than COM add-ins, and you don't need an entirely separate programming language. You can create Access add-ins using Visual Basic for Applications (VBA), which comes with Access. Access add-ins are stored in files that have `.mda` or `.mde` extensions.

To see what Visual Basic for Applications is all about, see Book VIII.

Types of add-ins

Even though Access add-ins are easier to create than COM add-ins, they're still far from simple to create. You really need to be fluent in VBA first in order to create any code at all. You can create three main types of add-ins:

- **Wizards:** Custom wizards are similar to the many wizards available throughout Access, to help less sophisticated users with complex tasks in a step-by-step manner.
- **Builders:** Custom builders, similar to the Expression Builder, help users create complex expressions.
- **Menu Add-Ins:** Make complex procedures available as options on the Access menu.

In order for your custom code to function as an add-in, you also need to create a USysRegInfo table that defines a subkey or value to be added to the Windows Registry. For details, go to the Microsoft Developer Network Web site at `msdn.microsoft.com` and search for the phrase *Access+Add-In*.

Locking Up Your Database as an ACCDE File

If you make an Access database for other people — especially people who may be a teeny bit clueless about Access — you may want to lock up your database to prevent other users from making changes that may break it.

Chapter 3 of this minibook talks about adding security in the form of user names and passwords, but a simpler option is to turn your database from an ACCDB file to an ACCDE file.

What's an ACCDE file, we hear you asking. An ACCDE file is the same as a regular Access ACCDB database file, with the following changes:

- All VBA procedures are *compiled* — converted from human-readable code (more or less readable, anyway) to a format that only the computer understands. This change prevents a database user from reading or changing your VBA code. (See Book VIII for how to write VBA procedures.)
- No one can create forms or reports or modify the existing ones (you can't even open them in Design view). You can't import any, either.

Be sure to keep a copy of your original ACCDB file! If you need to make changes to your VBA code, forms, or reports (or create new ones), you need to use the ACCDB file, not the ACCDE file. ACCDE files are most commonly used for the front-end database when you split an application into two databases (front end and back end), as we describe in Chapter 2 of this minibook.

Creating an ACCDE file

Saving your ACCDB file as an ACCDE file is easy. Follow these steps:

1. **Make sure your database is in Access 2007 file format by opening the database.**

   Take a look at the title bar of the Database window. (Press F11 if it's not visible.) If the title bar says anything but (Access 2007 file format), you need to convert it to the latest file format. (See the "Converting Databases" section, earlier in this chapter.)

2. **On the Ribbon, choose Database Tools➪Database Tools➪Make ACCDE.**

   Access closes the database to do the conversion. Then you see the Save ACCDE As dialog box.

3. **Specify the folder and file name for the file and click the Save button.**

   Access creates the new ACCDE file while leaving the original ACCDB file untouched. Then the new ACCDE file opens.

If Access runs into a problem while making the ACCDE file, a message appears with a Show Help button. Click the button to find out what's wrong.

Making updates later

Sooner or later, you're going to want to make a new report or fix an annoying typo in a form. You have to go back to your ACCDB file to make these kinds of changes because you can't make changes in an ACCDE file.

If the ACCDE file is a front-end file, with no data stored in it, you can just make your changes to the original ACCDB file and resave it as an ACCDE file. Because all your data lives in the back-end database, you're all set. (If you're wondering what the heck we're talking about, see Chapter 2 of this minibook.)

However, if your ACCDE file contains tables full of valuable information, you can't just abandon it. If you use the ACCDE file to do data entry and editing, that file contains your up-to-date tables. The original ACCDB file has editable forms, reports, and VBA code, but doesn't have the latest version of the data stored in your tables.

Not a problem. Follow these steps:

1. **Rename your ACCDE file as a backup file.**

   For example, add today's date to the end of the file name (right before the `.mde` part). You're about to create a new ACCDE file, but you don't want to lose the data in this file.

2. **Open the original ACCDB file and make any changes to contain the forms, reports, and VBA code that you want.**

   If you plan to make drastic changes, make a backup copy of the MDB first.

3. **Choose Database Tools➪Database Tools➪Make ACCDE from the Ribbon and save it as an ACCDE file with the name that your ACCDE file originally had.**

   Now you have an updated ACCDE file with new, improved forms, reports, and VBA procedures, but with old data. You also have an updated ACCDB file with your new, improved forms, reports, and VBA code — but out-of-date tables.

4. **Delete all the tables from this new ACCDE file.**

   In the Database window, click the All Tables button in the Database Window, or the All Tables heading in the Access All Objects list, click each table in the list that appears in the right pane, and then press the Delete key for each table. You have to confirm each deletion by clicking the Yes button. Deleting tables sounds dangerous, but remember: You have all these tables stored safely in your old ACCDE file.

5. **Import the tables from the old ACCDE file to the new one.**

   From the Ribbon, choose External Data➪Import➪Access and choose the name you gave your old ACCDE file in Step 1.

   You see the Import Objects dialog box, with tabs for Tables, Queries, Forms, Reports, and other objects.

6. **Click the Select All button with the Tables tab selected and then click OK.**

   Access imports your tables from the original ACCDE to the new ACCDE files, replacing the older data in the tables.

7. **Import any queries or macros in the old ACCDE database that you created or changed.**

   Repeat Steps 5 and 6, but use the Queries and Macros tabs on the Import Objects dialog box to import whatever changed.

If you're going to do this often, consider splitting your table into a front end and a back end, as described in Chapter 2 of this minibook. With a split database, you don't have to re-import your updated tables: You can just leave them in the unchanged back-end database.

Chapter 2: Sharing the Fun — and the Database: Managing Multiuser Access

In This Chapter

- **Sharing an Access database over a LAN**
- **Splitting your database into a front end (for each user) and a back end (where the data lives)**
- **Setting up groups of objects that people use frequently**
- **Editing data when someone else may be editing the same record**

Your database probably contains such terrific information that lots of people in your organization want to use it. If the database stores customer names and addresses, your colleagues may want to use this information — and wouldn't it be great if only one person had to enter an address correction in a shared address book, instead of everyone maintaining a separate one?

Well, Access has been a multiuser database right from the beginning. More than one person can get at the information in your database, in these ways:

- **Everyone uses Access to open the database.** If your computer is on a LAN (local area network), you can store your Access database on a shared network drive and other people can run Access and open your database — keep reading to find out more.
- **Some people see the database information via Web-based forms.** You can allow anyone on your LAN (anyone with access to the database file, anyway) to see and/or edit database information by using a Web browser.
- **Store your data in a big, industrial-strength database server application.** Everyone uses Access to see the database. If your database gets really large, or you want a lot of people to be able to see and maintain it simultaneously (more than, say, 40 or 50 people), Access may not be

able to handle the load. Not a big problem. Move the tables to a database server program such as Oracle or SQL Server and continue to use your Access queries, forms, or reports to work with it. You just link your Access database to the tables in the database server. Because this is an increasingly common situation, Access 2007 comes with an option to migrate the data to an SQL Server database. To get started migrating your data to an SQL Server Database, click the SQL Server button on the Move Data group of the Database Tools tab of the Ribbon.

How you link an Access database to a database server depends on which server you use. Book II, Chapter 4 tells you how to link to tables in other database programs.

- **Use database replication.** Access has a feature that allows you to make copies of a database and pass them out to people who can make changes to the database. When you get the updated copies of your database back, Access combines all the information together. However, this method is complicated and (in our experience) error-prone; we recommend avoiding database replication unless you simply can't use another method.

This chapter describes how to set up a database in order for more than one person to open it at the same time, using computers that connect to a LAN.

Putting Your Database Where They Can See It

For other people on a LAN to be able to open your Access database, you need to store it in a shared folder — a *share*, for short. Follow these steps to make a shared folder in Windows XP:

1. **Choose Start➪My Computer to start Windows Explorer.**

   You see the My Computer window, listing your folders and disks. (See *Windows XP For Dummies*, by Andy Rathbone, if you want to know more about it.)

2. **Move to your Shared Documents folder.**

   In Windows XP, other LAN users can be allowed to have access to this folder.

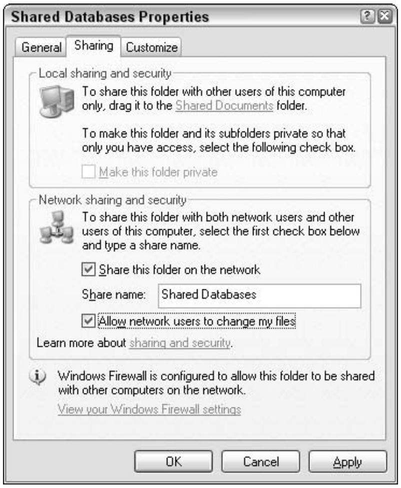
3. **Choose File➪New➪Folder from the menu, type in a name for the folder, and press Enter.**

   Shared Databases or Databases may be a good name for the folder.

4. **Right-click on the folder you just created; on the pop-up menu, select Sharing and Security. In the resulting pop-up window, check the Share This Folder Over The Network box.**

5. **Give your share a name that others can use to identify the share (by default, the share name is the name of the folder) and check the Allow Network Users To Change My Files check box.**

   Figure 2-1 shows an example of sharing the folder from a Windows XP computer over the network.


Shared Databases Properties
General
Sharing
Customize
Local sharing and security
Network sharing and security
OK
Cancel
Apply

To share this folder with other users of this computer only, drag it to the Shared Documents folder.

To make this folder and its subfolders private so that only you have access, select the following check box.

☐ Make this folder private

To share this folder with both network users and other users of this computer, select the first check box below and type a share name.

☑ Share this folder on the network

Share name: Shared Databases

☑ Allow network users to change my files

Learn more about sharing and security.

Windows Firewall is configured to allow this folder to be shared with other computers on the network.

View your Windows Firewall settings

Figure 2-1: Sharing over the network from Windows XP.

If you store your database file in this new folder, other people on the LAN can open it. Check with your LAN administrator to find out how to see a shared folder from each computer on the LAN that may want to use your database.

You don't have to make this folder in the Shared Documents folder. If you create it somewhere else, though, you need to share the folder with other people. Here's how:

1. **In Windows Explorer, right-click the new folder.**

   A shortcut menu appears.

2. **Choose the Sharing and Security option.**

   A Properties dialog box appears for the folder, with the Sharing tab selected.

3. **Choose the Share This Folder on the Network option and type a name in the Share Name box so other people can identify the folder.**

4. **Click OK.**

   You can tell that a folder is shared because its icon includes a little hand.

If you store a shared database on your computer, everyone else depends on the stability and speed of your computer. If you restart Windows after installing the latest update to your favorite game of Solitaire, everyone else loses the edits they make to the database. If you decide to run a big, hairy application that slows your computer down to a crawl, the other users of your database crawl, too. If your database is important, consider storing it on a network server, or at least on a little-used or lightly used PC.

Splitting Your Database into a Front End and a Back End

If you create a multiuser database, consider splitting your database into two pieces: the data (the tables and the relationships among them) and everything else. The database with the data is called the *back end* and the database with everything else — the queries, forms, reports, macros, and VBA procedures — is called the *front end.* You and other database users open the front-end database, which contains links to the tables in the back-end database.

Why split?

Splitting your database in two has some advantages. Two scenarios you could come across that have nothing to do with multiuser databases are

- You don't need to back up the front end nearly as often as the back end, because the front end rarely changes. By splitting your database into two files, you can back up just the back end, where the constantly updated data lives. (You do back up your data every day, right? See Chapter 1 of this minibook to find out how.)
- If you create a database that you plan to hand out to other people and each person has his or her own data, storing data in a separate back-end database is important. But all the users have the same front-end database. When you improve the front-end database, you replace everyone's old front-end database with your new one, without messing up each person's data, which is stored safely in the back end. For example, you may create a church management database program that tracks church members, committees, and donations, and then sell the database to zillions of congregations. By splitting the database, you can provide updates to the front end later (with improved forms, reports, and programming) without disturbing each congregation's data in the back-end database.

Splitting your database is even more important if you create a multiuser database in which everyone opens the same forms and edits the same data, possibly at the same time. Here's why:

- **Each person has his or her own front-end database with user-specific forms and reports.** But all the front ends can connect to the same shared back-end database.
- **You can protect the front-end database by saving it as an ACCDE file.** (See Chapter 1 of this minibook.) People can't change the VBA code, macros, forms, or reports in an ACCDE file.
- **If the database grows into a huge project, the back-end part can migrate to a larger database system, such as MySQL or SQL Server, without changing the Access front end.** Your Access front end can link to large corporate databases as well as to an Access back-end database.

Of course, a few disadvantages exist:

- **You need to keep track of both files.** You can't get far with only one of the two databases. If you need to move your database to another computer, be sure to move both files. Back up both files regularly, too.
- **If you want to change the design of the tables in your database, you need to remember to make your changes in the back-end database.** Then make sure that the links still work from the front end.

What if some people have older versions of Access?

Be aware of what Access version you use for your database files. Access 2007 uses an entirely new file format. If anyone uses older versions of Access, you have two options: Upgrade this person to Access 2007 or later, or make your database readable by earlier versions. You can choose to create your database in Access 2000 format or Access 2002/2003 format or Access 2007 (by default). If people are using versions of Access earlier than Access 2000, make them upgrade — too much has changed since Access 95 and Access 97!

If you have to support older Access users, your back-end database must be stored in the appropriate format. In Access 2007, choose the appropriate file format when you're creating your database. Put this database — in place of your Access 2007 version — in the shared folder, which everyone now links to. Fortunately, because of the differences in the file format and file extensions, these older versions can have the same name and reside in the same location as your Access 2007 version.

You also need to create a front end in the same version of Access as the back end that you just created. The best idea is usually to maintain as many front ends as you have database users: one version in Access 2007, one in Access 2000 (for your 2000 users), and one in Access 2002/2003 (for your 2002 and 2003 users). Tell your users to copy the appropriate version to their computers for their use.

Let's split!

Access comes with a Database Splitter Wizard that splits a database into front and back ends — and even creates the links between the two databases.

To split your database into front-end and back-end databases, follow these steps:

1. **Make a backup copy of your database.**

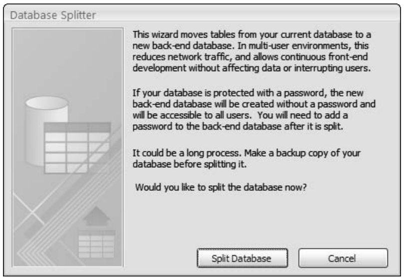
   You never know what could go wrong, and you certainly don't want your entire database to be trashed. (See Chapter 1 of this minibook for info on backing up your database.)

2. **Open the database in Access and close all the windows except the Database window.**

   Close all tables and anything that may refer to a table because the wizard can't run if any are open.

3. **On the Ribbon, choose Database Tools⇨Move Data⇨Access Database.**

   The Database Splitter Wizard appears, as shown in Figure 2-2.



This wizard moves tables from your current database to a new back-end database. In multi-user environments, this reduces network traffic, and allows continuous front-end development without affecting data or interrupting users.

If your database is protected with a password, the new back-end database will be created without a password and will be accessible to all users. You will need to add a password to the back-end database after it is split.

It could be a long process. Make a backup copy of your database before splitting it.

Would you like to split the database now?

Figure 2-2: Database Splitter Wizard.

4. **Click the Split Database button.**

   You see the Create Back-End Database dialog box, which looks just like a Save As dialog box.

5. **Type a name for the back-end database and click the Split button.**

   The wizard suggests the same name as your original database, followed by *-be* (for **back end**). You may want to use the original name plus the word *Data*.

Access creates a new, empty database with the name you specify. Each table exports to this new database, including the relationships among the tables, and then attaches the tables in the new back-end database to the current database, which has become the front-end database.

The wizard displays a message when it's finished, indicating whether the split was successful.

6. **Click OK.**

If you open the back-end database directly in Access, you find only tables — no queries, forms, reports, macros, or VBA modules. If you open the original database (which is now the front end), the tables are replaced by links to the tables in the back end.

Splitting by hand

Some people just don't trust wizards. If you'd rather split your database by hand rather than using the wizard, follow these steps:

1. **Create a blank database in your shared folder and name it `filename_be.accdb`, where *`filename`* is the original database name (or whatever name you want to use for the database).**

   This database is the back end. Make sure to store it in the shared folder where the back-end database lives and where other users can access it. Refer to Book I, Chapter 3 for more information on how to create a new database.

2. **On the Ribbon, choose External Data➪Import ➪Access, with the new database open.**

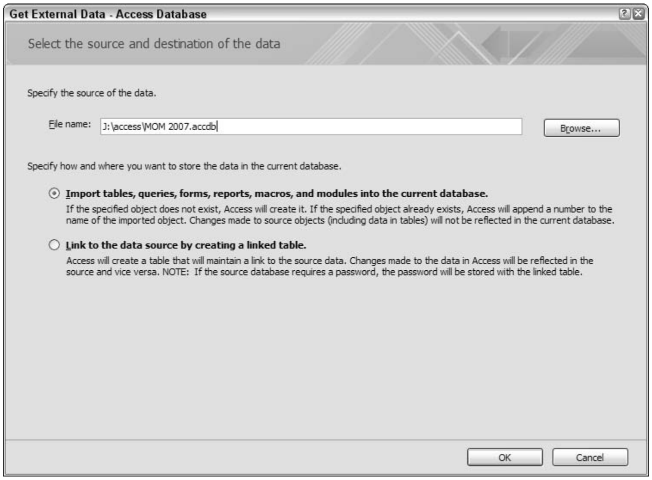
   The Get External Data dialog box, shown in Figure 2-3, appears.

3. **Choose the name of the database you want to split (either type in the path, or browse for it).**

4. **Click the Import Tables, Queries, Forms, Reports, Macros, and Modules Into The Current Database radio button. From the Import Objects window that appears, select the Tables tab and click Select All for the tables you want to import.**

   Access imports all the tables from your original database — and their names appear in the Database window. The back-end database is ready to roll!

   Alternatively, you could choose to link to the data source by creating a linked table. Access creates a table in the new database that links directly to the source data. Changes in the data in either database are reflected in the other.



Get External Data - Access Database

Select the source and destination of the data

Specify the source of the data.

File name: J:\access\MOM 2007.accdb

Specify how and where you want to store the data in the current database.

● **Import tables, queries, forms, reports, macros, and modules into the current database.**
If the specified object does not exist, Access will create it. If the specified object already exists, Access will append a number to the name of the imported object. Changes made to source objects (including data in tables) will not be reflected in the current database.

○ **Link to the data source by creating a linked table.**
Access will create a table that will maintain a link to the source data. Changes made to the data in Access will be reflected in the source and vice versa. NOTE: If the source database requires a password, the password will be stored with the linked table.

Figure 2-3: Use the Get External Data dialog box to split databases.

5. **Close the back-end database.**
6. **In Windows Explorer (My Computer), make a copy of the database you want to split. Name the copy with the same name you used in Step 1, but ending with *_fe* instead of *_be*.**

   This copy is the front end. You're making a copy so you leave your original database untouched, just in case something goes wrong.
7. **Open the new front-end database.**
8. **Click the Tables button in the All Access Objects list of the Database window to see all your tables — the ones you just imported into the back-end database — displayed in the right pane of the Database window.**
9. **Delete all the tables, one by one, by selecting each one, pressing the Delete key, and clicking the Yes button to confirm the deletion.**

   If Access reports that a relationship exists between the table you're deleting and other tables, click the Yes button to delete it.
10. **From the Ribbon bar, choose External Data➪Import➪Access➪Link Tables.**

    You see the Link dialog box, which is the bottom half of the Import dialog box.
11. **Choose your back-end database and click the Link button.**

    The Link Tables dialog box, with a list of the tables in the back-end database, appears.

12. **Click the Select All button and then OK to make links to all the tables in the back-end database.**

    Your table names reappear in the Database window, but with an arrow next to the icon for each one, to indicate that the table links from another database. Access even imports the relationships between the tables!

Handing out front ends

Each person who uses your shared database needs a copy of the front-end database on his or her own computer. (You can open a front-end database from a shared folder, but it loads and runs much more slowly.) You can copy the front end to each person's computer, or copy the front end to a shared folder and tell everyone to copy the file.

Before you pass out the front-end database, consider saving it as an ACCDE file, so people can't accidentally mess up the forms, reports, or VBA code. (See Chapter 1 of this minibook for more on saving a database file as an ACCDE file.) If you do, save a copy of the ACCDB file, too, so you have a way to make updates.

Relinking your tables

The links between the two databases work only as long as the files are in the same positions relative to each other. If you create the back-end database in the same folder as the original database, the two databases need to be in the same folder to work. If you need to move one of the files (for example, if you decide that you need to move the back-end database to a network drive where you can share it with other users on a LAN, and give copies of the front-end to the computers of various people in your office), you have to re-link the tables. To do so, follow these steps:

1. **Put the front and back ends in their new locations.**

   The two databases need to be in their new positions to ensure that everything works.

2. **Open the front-end database and click the Tables button in the Database window.**

   All your tables appear in the right pane of the Database window.

   Now you're ready to re-link tables.

3. **Right-click any table name and choose the Linked Table Manager option from the shortcut menu that appears, or choose Database Tools➪Database Tools➪Linked Table Manager from the Ribbon.**

   The Linked Table Manager opens.

4. **Click the Select All button, and then click the OK button.**

   The Select New Location Of dialog box opens.

5. **Navigate to the folder in which you put the back-end database, and click the icon for that back-end database.**

6. **Click the Open button in the dialog box where you selected the name of the database you want to work with, and then click the Close button in the Linked Table Manager dialog box.**

   Now Access knows the correct locations of your linked tables.

See Book II, Chapter 4 for more on how to create a link in one database to a table in another database.

Putting Your Favorite Objects into Groups

The All Access Objects list in the Database window has a button for each type of object that makes up an Access database, but having to click and scroll around the list to find the forms and reports you use most can be annoying. If several people use a database, each person may have favorite objects in daily use.

Access has a solution to this problem — groups. A *group* is like a folder in which you can put shortcuts to your favorite objects. Instead of having to search in the list for the forms and reports (or other objects) that you usually open, you can collect shortcuts to them in one place.

To put a shortcut to an object into a group, follow these steps:

1. **Click the All Access Objects link in the list of values in the Database window to see the usual Objects list, and then click the button for the type of object you want a shortcut for.**

   If you want to add the Orders form to your Favorites group, click the Forms button.

2. **Right-click the object you want and choose the Add to Group option from the shortcut menu that appears. Then choose the name of the group to which you want to add it.**

   If you haven't created any groups yet, your only option is the Favorites group.

   Nothing appears to happen, but if you click the Groups button and the group name, a shortcut icon now appears in the Database window.

Making and unmaking new groups

If only one person (you) uses the database, you can simply use the Favorites group. But if several people use this database (whether it's a single-file database or a front-end database), you can make a group for each person — or group of people — who use the database. For example, you may make groups for Accounting, Shipping, and Returns because the people in these three departments tend to use different forms and reports.

To create a new group, right-click on the title bar of the Navigation Pane in the Database window, select Navigation Options, and in the resulting window, choose Add Group.

To rename a group, right-click it and choose the Rename Group option from the shortcut menu that appears. Type a new name and click OK. If you want to get rid of a group, right-click it and choose the Delete Group option from the shortcut menu that appears. Click the Yes button to continue. Don't worry — the original objects aren't deleted, only the shortcuts.

Why bother creating groups and putting shortcuts to objects in them? You'll like having shortcuts to all your favorite objects in one place. To open any object in a group, just double-click it. After you add all your favorite forms and reports to a group, you can use the group as a sort of main menu for the database.

Editing with Multiple Users

Actually, to set up Access for more than one person to open your database, you don't have to do a thing other than store the database file in a shared folder. Access has multiuser features built in! Just open the database once on your computer and again from a second computer. Poof! You're *both* using the database!

Everything works fine if multiple people use front-end and back-end databases, too. One back-end database lives in a shared folder and multiple people have copies of the front-end database running on their computers. When several people open the front end at the same time, they all link to tables in the back end. No problem!

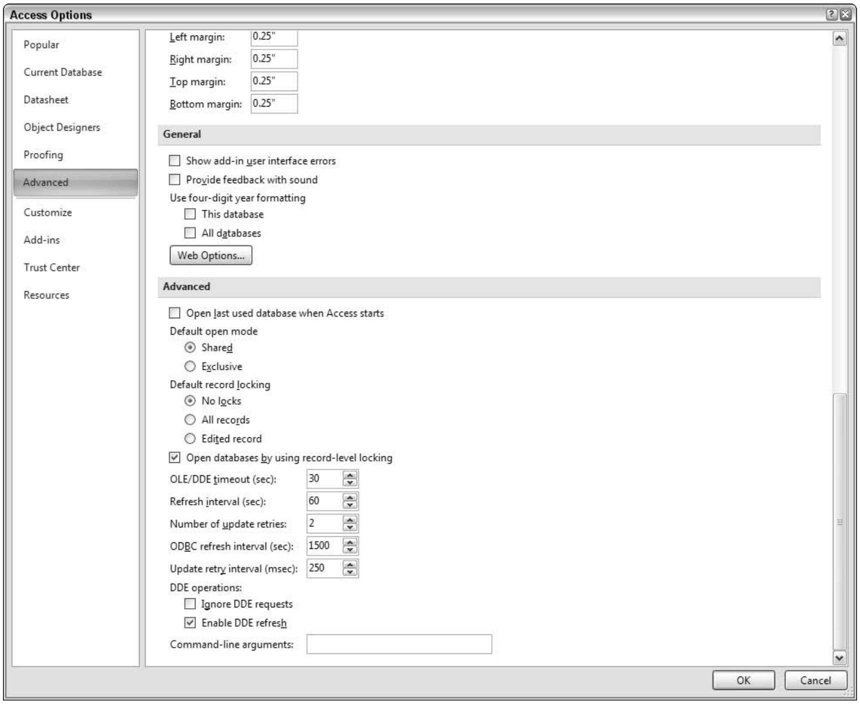
Multiuser access works just great as long as everyone looks at the data without making any changes. Two people can look at the same table — even the same record — at the same time. People can open forms and print reports. Peachy.

Fixing exclusive access

Well, okay, you may have to do one thing. If the second person who tries to open your database gets an error message saying that the database is already in use, it means that the database is in exclusive mode, in which the database can only be opened by one person at a time. (How very exclusive!) If this happens, the person who has the database open must follow these steps:

1. **Click the Office Button. In the dialog box that appears, click the Access Options button and the Access Options dialog box, shown in Figure 2-4, appears.**
2. **Click Advanced in the pane on the left and then choose the Shared radio button under Default Open Mode. Click OK.**
3. **Close the database and reopen it.**

   Access now opens the database in *shared mode*.



Left margin: 0.25"
Right margin: 0.25"
Top margin: 0.25"
Bottom margin: 0.25"

General

□ Show add-in user interface errors
□ Provide feedback with sound
Use four-digit year formatting
□ This database
□ All databases
Web Options...

Advanced

□ Open last used database when Access starts
Default open mode
● Shared
○ Exclusive
Default record locking
● No locks
○ All records
○ Edited record
☑ Open databases by using record-level locking
OLE/DDE timeout (sec): 30
Refresh interval (sec): 60
Number of update retries: 2
ODBC refresh interval (sec): 1500
Update retry interval (msec): 250
DDE operations:
□ Ignore DDE requests
☑ Enable DDE refresh
Command-line arguments:

Figure 2-4: Use the Access Options dialog box to choose Shared or Exclusive mode.

Managing record-locking

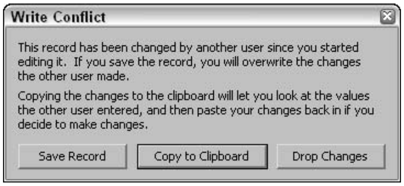
Okay, everyone can look at the information in the database. But what happens when two people want to edit a table at the same time? Or worse, two people want to edit the same record at the same time? The Access record-locking feature handles this situation.

To turn on the record-locking feature, Click on the Office Button. In the resulting dialog box, choose Access Options➪Advanced, scroll down to the Advanced section, and look at the Default Record Locking section. You have three options: No Locks, All Records, and Edited Record. The following sections detail how these three options work.

No Locks (no record-locking)

Multiuser editing works as follows without record-locking, when you uncheck the No Locks check box in the Options dialog box:

1. Person A opens a table or query (or a form based on a table or query) and begins editing a record.
2. Person B opens the same table or query, or a form or other query based on the same table that Person A is editing. Person B starts making changes to the exact same record that Person A is editing.
3. When Person A or Person B tries to save the record, Access displays the Write Conflict dialog box shown in Figure 2-5.



This record has been changed by another user since you started editing it. If you save the record, you will overwrite the changes the other user made.

Copying the changes to the clipboard will let you look at the values the other user entered, and then paste your changes back in if you decide to make changes.

Figure 2-5: Two people are trying to change this record at the same time.

If the person clicks the Save Record button, his or her changes write over whatever changes the other person made to the record. Not good. If the person clicks the Drop Changes button, he or she loses the changes in process. Also not good. Clicking the Copy to Clipboard button allows the person to compare the two people's changes and either choose between them or combine them. (This process is usually a pain — you have to check with the other person, compare changes, and decide which to keep.)

Records versus pages

Sometimes, Access locks more than just the record being edited. Access (and most other programs) stores information in chunks called *disk pages* or *pages* . Access retrieves information from your hard disk a page at a time, and Access can lock an entire page worth of information much more easily than locking a single record, which is usually smaller than a page. (How many records fit in a page depends on how big each record is. If your table has large records with lots of fields, a record may even be larger than a single page of storage.)

Rather than locking individual records, this system is called *page-level locking* rather than real record-level locking. Page-locking is faster and easier for Access than real record-locking, but in some applications, page-locking just isn't good enough. If you have several people entering and editing orders in an order-entry database at the same time, they may end up constantly locking each other out of records — very annoying.

You can control whether Access does true record-level locking or just page-level locking. On the Advanced tab of the Options dialog box (refer to Figure 2-4), check the Open Databases by Using Record-Level Locking check box to use record-level locking.

Sometimes Access just beeps, or beeps and displays a message that says that the record is locked, even though you turned locking off.

The No Locks option is usually a bad choice, because people can end up losing changes to records. Why not let Access prevent this from happening? Sometimes the computer really does know best.

The solution is for Access to lock the information that someone is editing. While the user is editing the information, no one else can make any changes. When the first person saves all changes, the next person can start editing — each takes a turn; simple enough.

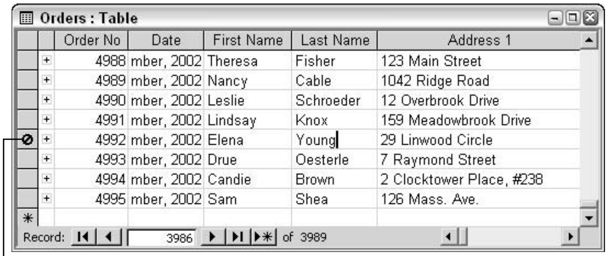
All Records (lock the whole table)

If you choose the All Records option, when someone starts editing a record, Access locks the entire table that contains the record. When someone else tries to edit any record in the table, Access just beeps and refuses to allow changes. This option means that two people can't change different records at the same time. Some databases require this option — for example, if each record contains information based on the records before it. However, for most databases, each record stands on its own; you can allow simultaneous editing of separate records.

Edited Record (lock one record)

Our favorite record-locking setting is to just lock the record you're editing. Leave the rest of them available for other people to edit.

If you try to edit a record that someone else is editing, Access beeps and doesn't allow you to make changes. The international "don't even think about it" symbol also appears in the record selector when a record is locked, as shown in Figure 2-6. Within a few seconds after the other person saves the changes, Access displays the changes on-screen, too. Then you can make your changes.



		Order No	Date	First Name	Last Name	Address 1
	+	4988	mber, 2002	Theresa	Fisher	123 Main Street
	+	4989	mber, 2002	Nancy	Cable	1042 Ridge Road
	+	4990	mber, 2002	Leslie	Schroeder	12 Overbrook Drive
	+	4991	mber, 2002	Lindsay	Knox	159 Meadowbrook Drive
⊘	+	4992	mber, 2002	Elena	Young	29 Linwood Circle
	+	4993	mber, 2002	Drue	Oesterle	7 Raymond Street
	+	4994	mber, 2002	Candie	Brown	2 Clocktower Place, #238
	+	4995	mber, 2002	Sam	Shea	126 Mass. Ave.
*						

Figure 2-6: The icon shows this record is locked.

Record is locked

Programming your locks

If you use forms to edit your tables (and most people do), you can control how each form locks records when someone uses the form to edit a record. Display the form in Design view by selecting the form in the Database window, right-clicking the form, and choosing Design View from the pop-up menu. Display the Properties sheet for the form by clicking the Properties button on the toolbar. Click the Data tab on the Properties sheet and look at the Record Locks property of the form. You can set it to the No Locks, All Records, or Edited Record (the default) option.

You can also write VBA code to control the way that tables and records are locked. See Book VIII, Chapter 5 for how to write VBA code that edits records.

If you want different people to have permission to see or change different information, you need to find out about the Access security features, which we describe in Chapter 3 of this minibook.

What's happening behind the scenes

Whenever anyone opens an Access database, Access creates a *Locking Information File* that contains information about who's doing what with the information in the database. Even if only one person opens the database, Access makes the file in the same folder and with the same file name as the database, but with the extension `.ldb` (people usually refer to this file as the *LDB file*). When you close the database, Access deletes the file. If more than one person has the database open, Access doesn't delete the folder until the last person closes the database.

Chapter 3: Securing Your Access Database

In This Chapter

- **Surveying the types of Access security**
- **Configuring your startup options to secure the database**
- **Setting a database password**
- **Understanding how user-level security works**
- **Creating a workgroup information file**
- **Creating user accounts and user groups in your database**
- **Assigning permissions to groups of users**
- **Password-protecting your VBA modules**

After you create a database, you may want to be able to control who can open it, look at the data, and change the data. If you're creating a database in which many people link to a shared back-end database, you should design security from the beginning — otherwise, your data is sure to deteriorate as different people use the database in different ways. Consistency may be the hobgoblin of little minds, but it's vital for clean data. You owe the users of your database protection from them accidentally doing something dumb.

Be sure to use validation in your tables and forms, too — read all about it in Book II, Chapter 5.

Access has several mechanisms for adding security to your database:

- Startup options that you use to display your own forms, menus, and toolbars instead of the standard Access ones. See the "Setting Startup Options" section, later in this chapter.
- Password-protecting your database. See the "Password-Protecting Your Database" section, later in this chapter.
- Converting your database to an ACCDE file to prevent anyone from editing forms, reports, and VBA modules. Chapter 1 of this minibook describes this process.

- User-level security, which allows you to create a system of users and permissions for what each user can do in your database. See the "Granting Database Access to Specific Users" section, later in this chapter, for the lowdown.

In addition, you can encrypt (encode) your database, regardless of what other security systems you use. (See the "Encrypting your database with a password" section, later in this chapter.)

Windows Security

Your first line of defense for your Access database — no matter what Access security options you choose — is securing the computer where you store the database. Be sure you set a Windows password. If the database lives in a shared folder on a local area network, check with your LAN administrator to make sure that only the right people have access to the shared folder.

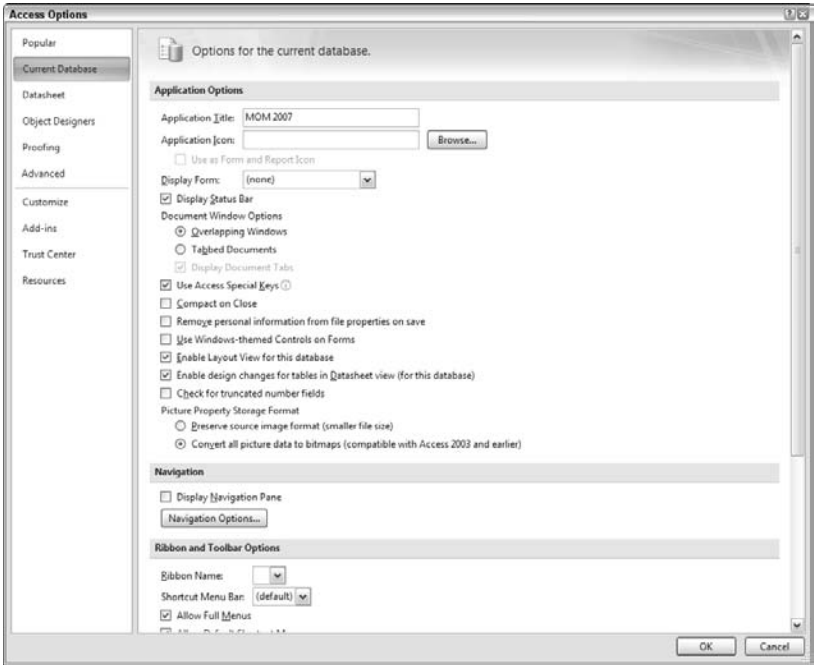
Part of security is making sure no one walks off with your database — such as copying it and taking it off-site — or deletes it! That's why Windows-level and LAN-level security is important.

For information about networking and Windows security, see *Networking For Dummies* (by Doug Lowe), *Windows XP For Dummies* (by Andy Rathbone), or Windows Vista For Dummies, Special Preview Edition (also by Andy Rathbone) — all are published by Wiley Publishing, Inc.

Setting Startup Options

If you don't want users entering data (except in the forms you create); modifying your tables, queries, forms, and other database objects; and generally screwing up your lovely Access system, you can prevent them from using (or even seeing) the normal toolbars and menus in Access. In both regular Access databases (`accdb.mdb` files) and Access projects, you can set the startup options to control what the database user can see and do.

Click the Office Button and from the resulting window select Access Options to display the Access Options box, shown in Figures 3-1 and 3-2, which is where most of the action takes place. The settings in the dialog box apply to the current database (or project). If you change them, many don't take effect until you exit and reopen the database. Table 3-1 lists the settings that control what users see and can do when they open your application.



Options for the current database.

Application Options

Application Title: MOM 2007

Application Icon:

□ Use as Form and Report Icon

Display Form: (none)

☑ Display Status Bar

Document Window Options

● Overlapping Windows

○ Tabbed Documents

☑ Display Document Tabs

☑ Use Access Special Keys

□ Compact on Close

□ Remove personal information from file properties on save

□ Use Windows-themed Controls on Forms

☑ Enable Layout View for this database

☑ Enable design changes for tables in Datasheet view (for this database)

□ Check for truncated number fields

Picture Property Storage Format

○ Preserve source image format (smaller file size)

● Convert all picture data to bitmaps (compatible with Access 2003 and earlier)

Navigation

□ Display Navigation Pane

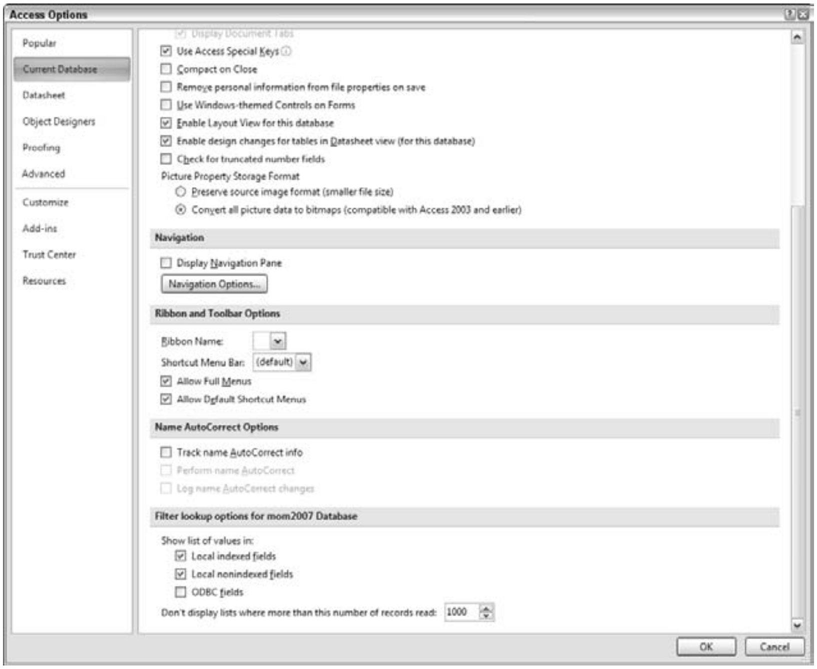
Ribbon and Toolbar Options

Ribbon Name:

Shortcut Menu Bar: (default)

☑ Allow Full Menus

Figure 3-1: The top half of the Access Options box.



☑ Display Document Tabs

☑ Use Access Special Keys

□ Compact on Close

□ Remove personal information from file properties on save

□ Use Windows-themed Controls on Forms

☑ Enable Layout View for this database

☑ Enable design changes for tables in Datasheet view (for this database)

□ Check for truncated number fields

Picture Property Storage Format

○ Preserve source image format (smaller file size)

● Convert all picture data to bitmaps (compatible with Access 2003 and earlier)

Navigation

□ Display Navigation Pane

Ribbon and Toolbar Options

Ribbon Name:

Shortcut Menu Bar: (default)

☑ Allow Full Menus

☑ Allow Default Shortcut Menus

Name AutoCorrect Options

□ Track name AutoCorrect info

□ Perform name AutoCorrect

□ Log name AutoCorrect changes

Filter lookup options for mom2007 Database

Show list of values in:

☑ Local indexed fields

☑ Local nonindexed fields

□ ODBC fields

Don't display lists where more than this number of records read: 1000

Figure 3-2: The bottom half of the Access Options Box.

Table 3-1 The Access Options Box Settings

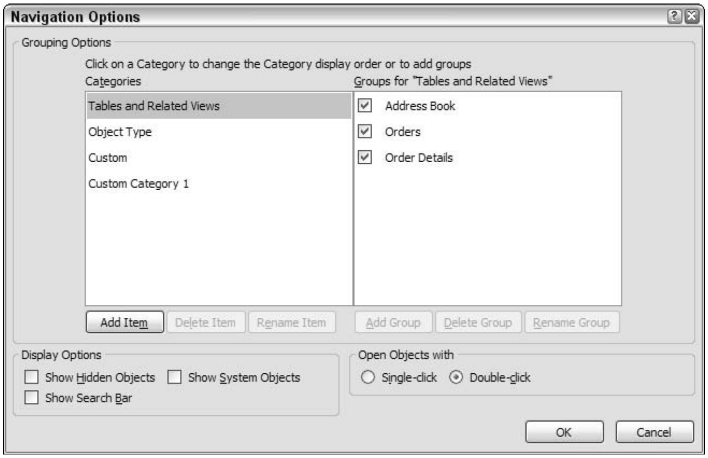
Setting	*What It Does*
Application Options	
Application Title	Sets the title of the application in the title bar
Application Icon	Sets a unique icon that is associated with the application. Overrides the default "Access" icon
Display Form	Designates the form that is shown first by default
Display Status Bar	Specifies whether or not the status bar shows up at the bottom of the Access window
Document Window Options	Overlapping Windows—Specifies that you want the default action of having windows opened one at a time and overlapping each other Tabbed Documents—Specifies that you want your new windows to be opened as one document with tabs rather than each individual window on its own
Use Access Special Keys	Sets the database to allow the use of Show Navigation Pane, Show Immediate Window, Show VB Window, and Pause Execution
Compact on Close	Sets the database to automatically compact on close rather than only when you compact it deliberately
Remove personal information from file properties on save	Removes your personal information from the database properties when you close the database
Use Windows Themed Controls on Forms	Overrides the Access controls with those that would match the Windows defaults of the user
Enable Layout View for this database	Allows users to view (and usually alter) forms and reports in Layout view
Enable design changes for tables in Datasheet view for this database	Allows users to make design changes to tables in the database when they view them in Datasheet view
Check for truncated number fields	Makes sure that you are not losing significant digits in numbers. For example, if users are entering numbers that are 10 digits and your field is only defined as 8 digits, you would lose information unless you check for truncated number fields.
Picture Property Storage Format	Preserve Source Image Format (smaller file size) is the new Access 2007 version. This allows you to store TIFF or JPG or GIF images as in their original format rather than converting them to bitmap images. Convert all picture data to bitmaps (compatible with Access 2003 and earlier). This converts all images to bitmaps and is the default for older versions of the database.

Setting	*What It Does*
Navigation	
Display Navigation Pane	Allows all users to be able to see the Navigation Pane. (Clicking the Navigation Options button under the Display Navigation Pane checkbox launches a window with the additional options. See Figure 3-3.)
Grouping options	Tables and Related Views groups objects on the Navigation Pane by tables and their related views. Object Type groups objects on the Navigation Pane by object type. Custom allows you to create custom groupings on the Navigation Pane.
Display Options	Show Hidden Objects allows all users to see any hidden objects. Show Search Bar allows users to use the search bar to search for fields in the database. Show System Objects riskily allows any user to see the system control objects. Use this with caution.
Open Objects With	Single-Click lets people open objects with just one click. Double-Click makes people use the historically typical Windows double-click to open objects.
Ribbon and Toolbar Options	
Ribbon Name	Allows users to set a custom Ribbon bar for the application
Shortcut Menu Bar	Allows users to set a custom Shortcut Menu Bar
Allow Full Menus	Allows users to see the full menu options for all menus
Allow Default Shortcut Menus	Allows users to use the default shortcut menus as well as any new custom ones
Name AutoCorrect Options	
Track Name AutoCorrect Info	Tracks anything that Access automatically corrects (any information that it feels is misspelled)
Perform Name AutoCorrect	If Track is turned on, this appears not grayed out, and if checked, sets Access up to automatically correct misspellings.
Log name AutoCorrect Changes	If Perform is turned on, you can choose to log all of the AutoCorrect actions that Access takes. This is often the safest method of running in AutoCorrect mode as it allows you to go back later and fix anything that might have gotten messed up.

(continued)

Table 3-1 ***(continued)***

Setting	*What It Does*
Filter lookup options for <database name> Database	
Show List of Values in:	This set of options allows you to determine how lists of values are displayed. You can select multiple selections.
Local indexed fields	Allows you to use lists of values to narrow down selections based on indexed fields
Local nonindexed fields	Allows you to use lists of values to search more quickly through non-indexed fields
ODBC fields	ODBC is Open Database Connectivity, and this field allows you to use lists of values across multiple databases connected in this manner.
Don't display lists where more than this number of records read	Limits the amount of resources that are consumed (human as well as computing) in creation and searching through the resulting lists of values. Default 1000 Max 999999999


Navigation Options

Grouping Options

Click on a Category to change the Category display order or to add groups

Categories: Tables and Related Views, Object Type, Custom, Custom Category 1

Groups for "Tables and Related Views": ☑ Address Book, ☑ Orders, ☑ Order Details

Display Options: □ Show Hidden Objects □ Show System Objects □ Show Search Bar

Open Objects with: ○ Single-click ● Double-click

Figure 3-3: The Display Navigation Pane options box.

After you customize a database Access Options dialog box, when you (or anyone) open this database, Access performs the startup actions you specified. Then Access runs the `AutoExec` macro, if any, which performs additional actions. (See Book VI, Chapter 2 for how to create an `AutoExec` macro.)

Sometimes you need to bypass the settings in the Current Database section of the Access Options dialog box. No problem! Hold down the Shift key while the database opens. Of course, if other people use this shortcut, you have a huge security hole. You can set the `AllowBypassKey` property to the `False` setting for your database (using a macro or VBA procedure), but then *you* won't have a way in either. Be sure to save a version of your database *without* this command!

Password-Protecting Your Database

Halt — who goes there? You can tell Access not to allow anyone to open your database until he or she types in the right password.

This system is all-or-nothing, which is a problem: After you allow someone to open the database, he or she can do anything to the database unless you take additional security measures. You also can't set a password on an Access project file, only on a regular database file (`accdb.mdb` file).

Setting a database password ensures that no one opens it in Access without the password. By using Access 2007, it is now impossible for anyone to simply open the database in a programming editor (a text editor that can deal with the control characters that live in data files). Encryption — writing the database file in a scrambled format that can be unscrambled only with the password — doesn't do any good if you haven't also protected the database from Access, either by setting a password or by creating user-level security, as described in the "Granting Database Access to Specific Users" section, later in this chapter.

Access makes it so much easier in version 2007 by combining password protection and encryption in one easy step. The database doesn't appear (to you at least) to have changed at all because Access decrypts the database automatically when you open and work with the database. The database may work a little more slowly, however, because Access has to encrypt and decrypt the information every time it reads or writes the database file.

Encrypting your database with a password

Follow these steps to encrypt your database with a password:

1. **Make a backup copy of the database and store it somewhere safe.**

   This copy doesn't have a password. If you lose the password to the database, at least you have this backup. You may want to burn it to a CD and store the CD in something heavy that's locked.

2. **Make sure no one else has the database open.**

   You need sole access to the database to assign a password. In fact, you need exclusive access, in which everyone is temporarily locked out.

3. **Close the database. Then click the Office Button, and from the dialog box choose Open and select the name of the database.**

4. **Click the little arrow to the right of the Open button in the Open dialog box (instead of the Open button) and choose the Open Exclusive option from the menu that appears.**

   Access opens the database with exclusive access.

5. **On the Ribbon, choose Database Tools➪Database Tools➪Encrypt with Password.**

   You see the Set Database Password dialog box, shown in Figure 3-4.

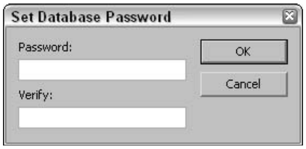


Figure 3-4: Setting a password for a database.

6. **Type the database password once in each box and click OK.**

   If you don't type the password the same way in both boxes, Access complains, and you have to type them again.

   Note that capitalization counts in passwords. A password can be up to 20 characters, and can include letters, numbers, and some punctuation.

Opening a password-protected database

After you set a password, whenever you (or anyone else) try to open the database, you see the Password Required dialog box, shown in Figure 3-5.

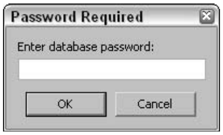


Figure 3-5: You can't open this database until you type the right password.

If you forget your database password, you are hosed. No command, service, or secret incantation can get your password back.

But what happens if another database (one with no password) links to your password-protected database? Answer: When you create a link to a password-protected database, Access asks you for the password. If you don't know it, you can't create the link. However, after you create the link, Access saves the password so you can see the linked table in the future without entering a password — and that means you have an unguarded backdoor into your password-protected database (at least, to the linked tables in your database). Oops.

Granting Database Access to Specific Users

For most databases (and computer systems in general), giving different people permission to do different things makes sense. A data-entry clerk may have permission to enter information, but not to edit existing information or delete anything. The system manager may have permission to do almost anything. And other users fall somewhere in between.

Access has a system of user-level security in which you can create users and groups of users. You grant specific permissions to specific users or groups. When each user opens the database, he or she types a user name and password, so Access always knows who is using the database and allows or disallows commands accordingly. This system works with both Access databases (`accdb.` files) and Access projects.

This section covers the basics of converting a regular database to a secured database using user-level security. For a detailed, if slightly out-of-date, write-up about Access user-level security, see the following Web page:

```
http://office.microsoft.com/en-
   us/assistance/HA011381161033.aspx
```

How user-level security works

With user-level security, Access maintains a database of users and groups. Users can log in to Access and use your database. Groups are objects to which users can belong. For example, you can have users named `Zac`, `Neil`, and `Stuart`, and they can all belong to a group named `Users`. `Zac` may also belong to a group called `Administrators` and `Neil` and `Stuart` may also belong to a group named `Managers`.

This database of users and groups is stored in a workgroup information file or workgroup file or system database with the file name extension `.mdw` (Microsoft Database Workgroup). Each time Access opens a database, it looks for a workgroup file, checks whether users are required to log in with passwords, and then asks for user names and passwords if those are needed.

After you set up your users and your groups, you grant permissions to them. You give a user or group permission to use a database object in a specific way — you can give the Managers group permission to create reports, but not to change the design of tables. When you grant permission to a group, you grant it to all the members of that group. When you use a database with user-level security, each time you open, print, or otherwise work with a database object, Access checks the permissions of your user account to make sure that the action is allowed.

Every object in an Access database has an owner — a user or group that owns the object. The owner of an object has full permission to do anything with that object. The person who creates the object is initially the owner of the object, but you can transfer ownership to someone else.

The default workgroup file

Actually, all Access databases have user-level security — you've been secretly using it since you started using Access. Access comes with a generic workgroup file that contains one user — Admin — and two groups — Users and Admins. The Admin user has no password and full permission to do anything to any database object. Whenever you run Access, Access logs you in as the Admin user. You never encounter the user-level security system until you secure your database.

The Admin user owns all the objects in an unsecured database, because you log in as the Admin user when you create all the objects. You normally have full permission to do anything with all database objects, because you are their owner.

If you want to create a secure database where theonly people who can open or change things are the people you designate, you need to create users and groups and grant permissions to those users and groups. But you also need to remove ownership and permissions from the Admin user, because every Access installation has the same Admin user: Whatever your Admin user has permission to do, someone using the generic workgroup file can do, too. Similarly, the Users group has full rights to all database objects. You need to revoke those rights, leaving only the specific permissions you want to give to specific users and groups.

The generic workgroup file is called System.mdw and is stored in this folder:

```
C:\Documents And Settings\username\Application
    Data\Microsoft\Access
```

(Replace *username* with your actual Windows username.) To secure your database, you stop using this workgroup file and create a new one.

REMEMBER

Windows also has a system of users and passwords, which you can control by choosing Start➪Control Panel➪User Accounts (in Windows XP). Access user-level security is unconnected to Windows security; no relationship exists between Windows users and Access users.

Your new workgroup file

When you secure your database, you make a new workgroup file. You have two options:

- Make the new workgroup file the default for all the databases you open in Access.
- Leave your default workgroup file alone and continue to use it with databases that don't need to be secure. Tell Access to use your new workgroup file only with specific databases.

Choosing your users and groups

The first step in setting up user-level security is to choose your users and groups. Choosing your users is easy — just make a list of all the people who may possibly use your database. Make each one a user.

Next, create a group for each department, committee, or other group of people who need the same access to database objects. A user can be in more than one group — the sales manager can be in both the Sales group and the Managers group. A user gets all the permissions from all the groups of which he or she is a member. If you are a member of the Accounting and Admins groups, you have the permissions from both groups.

The default groups

All workgroups include two default groups:

- **Users:** Includes all the users. Every Access workgroup file has a Users group, and they are all identical internally. Any permissions that your Users group has can be exploited by someone with a copy of the default Access workgroup file.
- **Admins:** Includes all administrative users — users to whom you want to grant permission to administer the security system, create users and groups, change passwords, and grant permissions. The Admins group must have at least one member (say, you), or no one is able to fix security problems.

TIP

User and group dos and don'ts

Some tips for choosing your users and groups include the following:

- **Don't assign permissions to users, only to groups.** Having a group with only one user is okay. When a receptionist is promoted to the Sales Department, you can move him or her from the `Receptionists` group to the `Sales` group, with all the rights and privileges thereunto appertaining. Moving someone from one group to another is easy: Changing the permissions for every object in the database to which this person does (or should) have access is a pain.
- **Don't plan for people to share a user name.** If three people work as the company receptionist over the course of the day, and spend their spare time doing data entry, don't create a user named `Receptionist`. Instead, create individual user accounts for each person, and a group named `Receptionists` or `Data Entry Folks`. This method allows you to grant extra permissions to someone who takes on an additional responsibility, without giving the same permissions to anyone else — you just add the person to an additional group.
- **Use plural words for the names of groups and singular words for the names of users.** This system clarifies what's a user and what's a group and avoids the situation where you try to give a user and a group the same name. Department or committee names for groups can be an exception to the rule (for example, `Accounting` or `Marketing`).

PIDs, GIDs, and SIDs

When you create a user or group, you type in three pieces of information:

- **User name:** Use a consistent naming convention to avoid confusion. Use first names followed a last initial, or full names, or last names only.
- **Company name:** If you're not part of an organization, make something up. Use the same entry for all the users and groups.
- **Personal identifier (PID) or Group identifier (Group ID or GID):** A string of letters and numbers that you make up, from 4 to 20 characters long. Capitalization counts.

Access combines the user name, company name, and PID or GID to create a secret security ID (SID) for each user and group. Access uses this SID to keep track of what the user or group has permission to do to each object in the database.

If you lose the workgroup file that contains all the users and groups, you can recreate the file by entering the exact same user names, company names, and PIDs — with the same inputs, Access creates the exact same SID for each user and group, and your database is up and running. Keep a list of the PIDs that you use: You may lose the workgroup file and have to re-create it. Keep this list secret, so no malefactor can create the workgroup file and use it to break into your database.

Securing a database

For your database to be safe, you need to create a new workgroup file with your new users and groups, remove ownership and permissions from the `Admin` user and `Users` group, encrypt the new database, and grant ownership and permissions to your new users and groups for each object in the Access database. Sounds like a lot of work! Luckily, Access comes with a wizard that can do a lot of it — the User-Level Security Wizard.

To get the User-Level Security Wizard working for you, follow these steps:

1. **Open the database for which you want user-level security.**

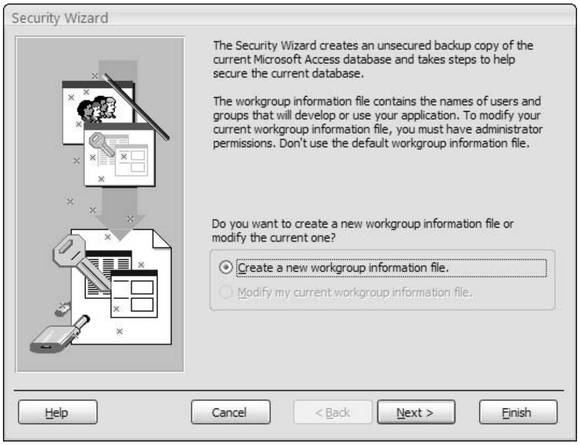
   Making a backup beforehand wouldn't be a dreadful idea, either.

2. **To launch the User-Level Security Wizard, click the button on the Quick Access toolbar next to the Office Button.**

   The Security Wizard window opens, and asks whether you want to create a new workgroup file or edit an existing one. If you haven't already created a workgroup file, the second option isn't available.

3. **Make sure that the Create a New Workgroup Information File option is selected and click Next.**

   The Security Wizard window now looks like Figure 3-6.



The Security Wizard creates an unsecured backup copy of the current Microsoft Access database and takes steps to help secure the current database.

The workgroup information file contains the names of users and groups that will develop or use your application. To modify your current workgroup information file, you must have administrator permissions. Don't use the default workgroup information file.

Do you want to create a new workgroup information file or modify the current one?

● Create a new workgroup information file.

○ Modify my current workgroup information file.

Figure 3-6: Creating a workgroup file with the User-Level Security Wizard.

4. **Enter the following information, which Access needs to create a new workgroup file:**

    - **File Name:** The name and location of the new workgroup file you are creating. The default is `Secured.mdw`, located in the same folder in which the database is stored, but you can click the Browse button to choose a different location.
    - **WID:** A string of numbers and letters, from 4 to 20 characters long, that Access uses to create an encrypted Workgroup SID (security ID). The Workgroup SID is what makes your new workgroup file different from the default workgroup file. Type a series of characters that no one is likely to guess.
    - **Your Name:** Optional.
    - **Company:** Optional.

    You may want to write down all this information, because you need it to re-create the workgroup file. Fortunately, however, you don't have to — because in Step 12 you print an Access report that includes this information.

5. **Choose whether to use this workgroup file as the default whenever you run Access, or just for this database. Then click Next.**

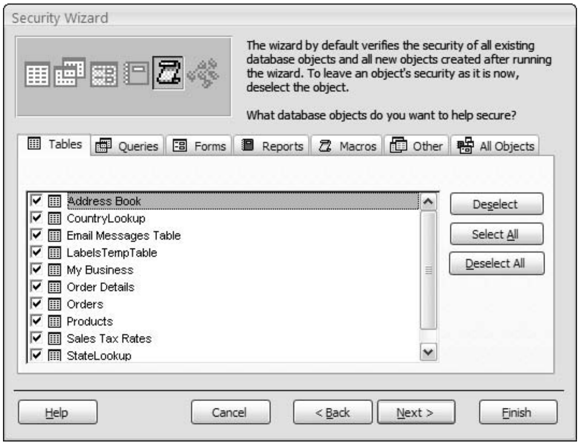
    If you choose the I Want to Make This My Default Workgroup Information File option, the wizard configures Access (via your Windows Registry) to use this new workgroup file whenever you run Access, unless you override the default for a specific database.

    If you choose the I Want to Create a Shortcut to Open My Security-Enhanced Database option, your default workgroup file is unchanged. The wizard creates a shortcut on the Windows desktop that runs Access, opens the database, and tells Access to use this workgroup file. (See the sidebar, "Starting Access with a specific workgroup," later in this chapter.)

    If you decide to replace your default workgroup file (`System.mdw`), make a backup of the original version first. (See the "The default workgroup file" section, earlier in this chapter, for the default location.)

6. **Leave all the objects selected, as shown in Figure 3-7, and then click Next.**

    A tab for each type of database object is in this window, except VBA modules, which are secured separately. (See the "Securing your VBA modules" section, later in this chapter.)



Security Wizard

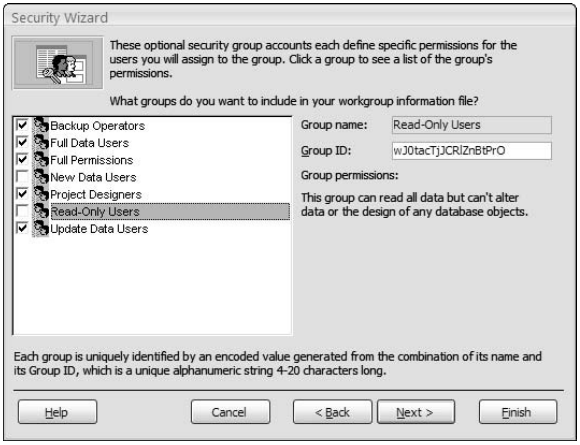
The wizard by default verifies the security of all existing database objects and all new objects created after running the wizard. To leave an object's security as it is now, deselect the object.

What database objects do you want to help secure?

☑ Address Book
☑ CountryLookup
☑ Email Messages Table
☑ LabelsTempTable
☑ My Business
☑ Order Details
☑ Orders
☑ Products
☑ Sales Tax Rates
☑ StateLookup

Figure 3-7: Select all the objects for which you want user-level security.

7. **For each group that you want Access to create, click its check box and type a Group Identifier (GID), as shown in Figure 3-8. Then click Next.**



Security Wizard

These optional security group accounts each define specific permissions for the users you will assign to the group. Click a group to see a list of the group's permissions.

What groups do you want to include in your workgroup information file?

☑ Backup Operators
☑ Full Data Users
☑ Full Permissions
☐ New Data Users
☑ Project Designers
☐ Read-Only Users
☑ Update Data Users

Group name: Read-Only Users

Group ID: wJ0tacTjJCRlZnBtPrO

Group permissions:

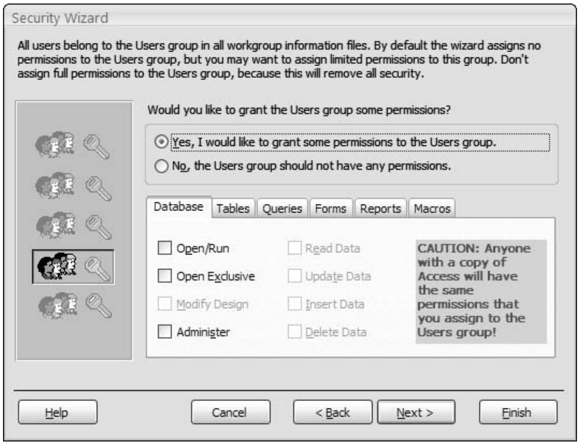
This group can read all data but can't alter data or the design of any database objects.

Each group is uniquely identified by an encoded value generated from the combination of its name and its Group ID, which is a unique alphanumeric string 4-20 characters long.

Figure 3-8: The User-Level Security Wizard can create some groups for you.

You can make a note of the name of each group you choose to create, along with the exact GID that you type, at least until you print a report that includes this information (in Step 12).

8. **Choose whether the `Users` group will have any permissions (we recommend that you choose `No`), as shown in Figure 3-9, then click Next.**



Security Wizard

All users belong to the Users group in all workgroup information files. By default the wizard assigns no permissions to the Users group, but you may want to assign limited permissions to this group. Don't assign full permissions to the Users group, because this will remove all security.

Would you like to grant the Users group some permissions?

● Yes, I would like to grant some permissions to the Users group.

○ No, the Users group should not have any permissions.

□ Open/Run

□ Open Exclusive

□ Modify Design

□ Administer

□ Read Data

□ Update Data

□ Insert Data

□ Delete Data

CAUTION: Anyone with a copy of Access will have the same permissions that you assign to the Users group!

Figure 3-9: Granting users permissions in the User-Level Security Wizard.

If you choose to grant permissions to the `Users` group, keep one thing in mind: You're not just granting permission to the users you create in your workgroup file. *Anyone* with an Access installation can use his or her default workgroup file — with its default `Users` group — to open the database and use the permissions that you grant. We recommend that unless you don't mind just *anyone* waltzing in and doing *anything*, leave this option set to the `No` setting. Why risk hijinks? You can create your own groups and give them permissions

If you do decide to ignore our advice and grant the `Users` group permissions, see the "Setting permissions for groups" section, later in this chapter, for what the various permissions mean.

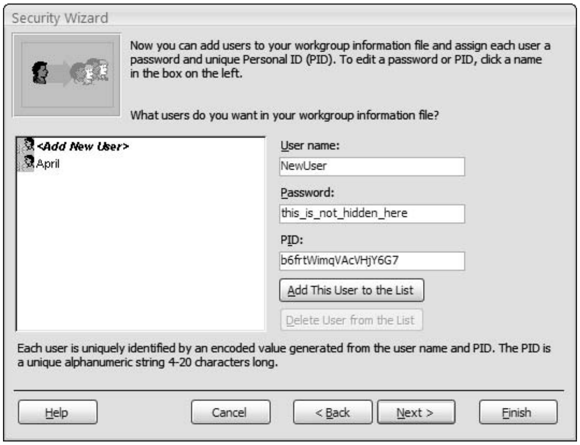
9. **Enter the information in order for Access to create each user name and click Add This New User to the List, as shown in Figure 3-10. When you finish, click Next.**

   The pieces of information you need to enter include the following:

   - **User Name:** The name for the user account. Be consistent with your names. Use each person's first and last names (spaces are allowed).
   - **Password:** The starting password for this user. The user can change it later.
   - **PID:** A string of numbers and letters, from 4 to 20 characters long, that Access uses to create an encrypted *SID* (security ID). Access uses the SID when storing permissions in databases. Type a series of characters that no one is likely to guess.

You can edit the password and PID for a user by clicking the user name on the list and editing the entries. Click the Add New User option on the list to continue adding users. (You may want to write down this information, but you'll print it all out in a report in Step 12.)

The wizard creates a user — you — using your Windows user name. You can't delete or change this name.



Now you can add users to your workgroup information file and assign each user a password and unique Personal ID (PID). To edit a password or PID, click a name in the box on the left.

What users do you want in your workgroup information file?

User name: NewUser

Password: this_is_not_hidden_here

PID: b6frtWimqVAcVHjY6G7

Each user is uniquely identified by an encoded value generated from the user name and PID. The PID is a unique alphanumeric string 4-20 characters long.

Figure 3-10: Creating users in the User-Level Security Wizard.

10. **Assign at least one user to the** `Admins` **group, as shown in Figure 3-11. If you create other groups, you can assign users to those groups, too. Then click Next.**

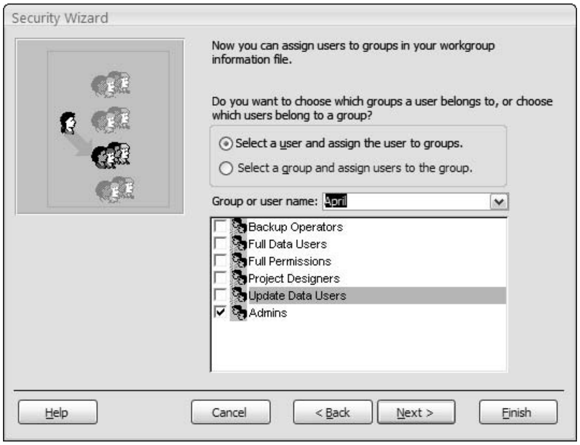
    The wizard creates the `Admins` group no matter what, which is the group of users who have administrative permissions (permission to create and edit users, groups, and passwords). It puts you (the user name created for you) in the `Admins` group.

    You can look at one user at a time or one group at a time, whichever you find easier. To switch, choose the Select a User and Assign the User to Groups options or the Select a Group and Assign Users to the Group option.

11. **Change the name or path for the backup copy of the database if you don't like the one that the wizard suggests, and then click Finish.**

    Access proposes to use the same name and folder as the original database, with the extension `.bak`, for an unsecured backup version.

    The wizard creates a workgroup file, creates the user and groups that you specified, creates a copy of the database, transfers ownership of the database objects that you selected from `Admin` to your user name, encrypts the new database, and displays a report about its success.



Security Wizard

Now you can assign users to groups in your workgroup information file.

Do you want to choose which groups a user belongs to, or choose which users belong to a group?

● Select a user and assign the user to groups.

○ Select a group and assign users to the group.

Group or user name: April

□ Backup Operators
□ Full Data Users
□ Full Permissions
□ Project Designers
□ Update Data Users
☑ Admins

Figure 3-11: Which users are in which groups?

12. **Print the report, which lists all the information you need if you ever need to re-create the workgroup file.**

    Access saves the report as an RTF file, which you can open with Word, WordPerfect, WordPad (which comes with Windows), or most other word processors.

13. **Click OK when the wizard displays a message confirming it created a new, encrypted version of your database. Then close Access.**

    You need to close and restart Access to open the new workgroup file.

14. **Copy the RTF file and the snapshot report to a diskette or burn them to a CD, stick it in a sealed envelope with the printout of the security report, and store it somewhere safe. Then delete the RTF file from your hard drive.**

    This information enables anyone who finds it to create a workgroup information file and open your database, so keep it safe.

Okay, you have a new workgroup file, a partially secured database, and your workgroup information backed up.

Opening your secure database

After the User-Level Security Wizard secures your database, you may need to open the database in a different way. If you chose to make your new workgroup file the default for all databases, you don't need to do anything differently: Whenever you open a database from now on, Access uses your new workgroup file.

However, if you chose to make a workgroup file for use with one (or more) specific database(s), the wizard creates a shortcut that runs Access and opens the database with the workgroup file you just created. Look on your Windows desktop for a new icon that shows the name of your database. Double-click this shortcut to open your secured database. You can copy this shortcut to any folder, or drag it to the Start menu.

See the "Starting Access with a specific workgroup" sidebar for how secure database shortcuts work.

To check whether your database is secure and to see the name of the workgroup file you are using, choose Workgroup Administrator. You can use the Create button on the Workgroup Administrator dialog box to create a new workgroup, but we recommend using the User-Level Security Wizard instead, because creating a workgroup doesn't do much good unless you change the `Admin` and `Users` settings, encrypt the database, and do all the other good stuff that the wizard does for you. You can click the Join button to switch which workgroup file this database uses.

Setting passwords

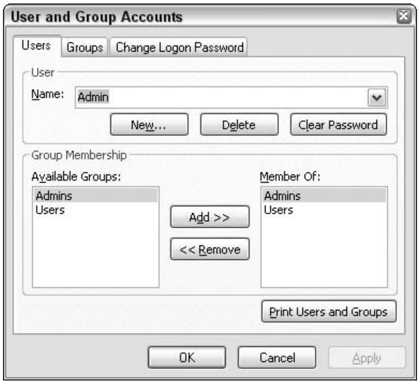
The database isn't secure until you enter a password for your user account — you find the account in the `Admins` group — and the rest of the `Admins` users set their passwords. To set your password, choose User and Group Accounts to display the User and Group Accounts dialog box, and then click the Change Logon Password tab. Type your old password (if you typed one when you created the user) and then a new password two times.

If someone forgets a password, clear the password by clicking the Users tab on the User and Group Accounts dialog box, setting the Name box to the user, and clicking the Clear Password button. Then tell the person to log in to the database with a blank password and set a password (as described in the preceding paragraph) right away.

Never clear the password for the `Admin` user! Access only prompts for user names and password if the `Admin` user has a password. If you secure a database and you clear the `Admin` password, the next time you open the database, you get a message that you don't have permissions for this database, and you have no chance to log in.

Creating the rest of your users and groups

You may create all your users in the User-Level Security Wizard, but creating all your groups with the wizard is unlikely. That's because the wizard doesn't provide many options for group names. Fortunately, you can create more users and groups any time: Simply choose User and Group Accounts from the same drop-down box icon that launched the User-Level Security Wizard and select the User and Group Accounts dialog box (shown in Figure 3-12) and have at it.



Name: Admin

Available Groups: Admins, Users

Member Of: Admins, Users

Figure 3-12: Creating or deleting user and group accounts, and assigning users to groups.

On the Users tab, you can create new user accounts, delete existing user accounts, and assign users to groups. When you choose a user name in the User section of the dialog box, Access lists the groups of which the user is a member in the Member Of list. Click the Add and Remove buttons to move group names from the Available Groups list to the Member Of list.

The Groups tab allows you to create additional groups. Then switch back to the Users tab to add people to your new group. Access stores the changes to your users and groups in the workgroup file, not in the database.

When you create new users or groups, be sure to type something into the Personal ID box. This entry is the PID or GID that Access uses to create the SID for the user or group. Write down your entries, taking careful note of the exact text (including capitalization) of the user name and PID, or group name and GID, in case you ever need to re-create the workgroup file.

The `Admin` user can't be deleted, and it creates a security hole in your database if you give `Admin` *any* permissions. Remove the `Admin` user from all groups except the `Users` group. (*Remember*: The `Admin` user account is a different thing from the `Admins` group.)

Setting permissions for groups

The information about specific permissions is stored in your database, not in the workgroup file. When you log in, you tell Access who you are, and

Access knows your SID (security ID). Each time you try to open a database object, Access checks whether your SID has permission to use that object in the way you are trying to use it — creating, editing, displaying, printing, and so on.

Types of permissions

For each type of database object (including the database as a whole), you can set the permissions listed in Table 3-2.

REMEMBER

Don't grant these permissions to individual users: Grant them to groups, and then add specific users to those groups.

Starting Access with a specific workgroup

You may not want to use the same workgroup file for all the databases you create. You may want most of your databases to remain wide open, with no user-level security, while securing one specific database.

You can tell Access which workgroup file to use with which database. Access uses only one workgroup file at a time, and you have to exit Access and restart to switch to another workgroup. If the same group of people use several secured databases, using the same workgroup file for all the databases makes sense — you make changes to users and groups in just one place.

When you start Access, you provide the name of the database, the name of the workgroup file, and even the user you want to log in as. You specify this information as part of a shortcut to the Access database. Make a shortcut to each secured Access database that includes the workgroup file required to open that database.

A *shortcut* is a Windows feature — you see them on your Windows desktop. Shortcuts can live in folders, too. You can tell a shortcut by examining its icon: If the icon includes a little bent arrow, it's a shortcut.

Luckily, you don't have to make a shortcut if you want a specific database opened with a specific workgroup file, because the User-Level Security Wizard creates one for you on the Windows desktop.

If you know how to create Windows shortcuts, you can make your own. The Target box needs to include

- **Path to Access program:** Usually `"C:\Program Files\Microsoft Office\Office11\Msaccess.exe"` (with the quotes, because the pathname includes spaces).
- **Database pathname:** The full pathname of your database file.
- **Workgroup pathname:** `/WRKGRP` followed by the full pathname of your workgroup file.

Here is a shortcut target for the `Northwind.accdb` database using the `Secured.mdw` workgroup:

```
"C:\Program Files\Microsoft Office\
        office11\Msaccess.exe""D:\
        Databases\Northwind.mdb"
        /WRKGRP "D:\Databases\
        Secured.mdw"
```

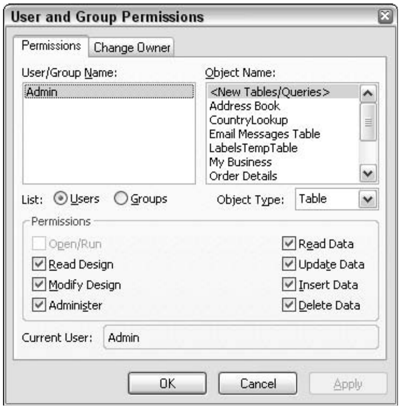
Table 3-2 Permissions for Database Objects

Object	*Permission*	*What It Lets You Do*
Database	Open/Run	Open database
	Open Exclusive	Open database for exclusive access
	Administer	Set database password; change startup options
Table	Read Design	View table in Design view
	Modify Design	Edit table in Design view; delete table
	Administer	Anything, plus assign permissions
	Read Data	View records
	Update Data	View and edit records
	Insert Data	View and insert records
	Delete Data	View and delete records
Query	Read Design	View query in Design view
	Modify Design	Edit query in Design view; delete query
	Administer	Anything, plus assign permissions
	Read Data	View records
	Update Data	View and edit records
	Insert Data	View and insert records
	Delete Data	View and delete records
Form	Open/Run	Open form
	Read Design	View form in Design view
	Modify Design	Edit form in Design view; delete form
	Administer	Anything, plus assign permissions
Report	Open/Run	Open report in Print Preview
	Read Design	View report in Design view
	Modify Design	Edit report in Design view; delete report
	Administer	Anything, plus assign permissions
Macro	Open/Run	Run macro
	Read Design	View macro in Design view
	Modify Design	Edit macro in Design view; delete macro
	Administer	Anything, plus assign permissions

Granting permission for an object to a user or group

After you run the User-Level Security Wizard, the `Users` group has no permissions, and neither do any of the other groups, except for the `Admins` group, which has full permissions. The next step in securing your database is to grant permissions to the groups you created.

To assign permissions, choose User and Group Permissions from that same handy drop-down box to display the User and Group Permissions dialog box. On the Permissions tab, shown in Figure 3-13, click the Groups radio button in the List options to assign permissions to groups.



User/Group Name: Admin

Object Name:
<New Tables/Queries>
Address Book
CountryLookup
Email Messages Table
LabelsTempTable
My Business
Order Details

List: ● Users ○ Groups

Object Type: Table

Permissions

□ Open/Run
☑ Read Design
☑ Modify Design
☑ Administer
☑ Read Data
☑ Update Data
☑ Insert Data
☑ Delete Data

Current User: Admin

Figure 3-13: Assigning permissions to groups to access specific objects.

Converting a secured database from an older version of Access

Access has had user-level security since version 2.0. If you want to upgrade a secured database from an older Access version to the latest version, create a new workgroup file in Access 2007 that exactly matches your old workgroup file. You need the Workgroup ID and all the group IDs (GIDs) and personal IDs (PIDs) used to create the original workgroup file. Then upgrade the database by Clicking the Office Button and selecting Convert Database.

If you don't have this information, you can't create a replacement workgroup file. In this case, removing the security, upgrading the database, and then re-creating the security is the best method. (You probably have some better ideas for the design of your users and groups, anyway!) To remove security, grant full permissions to the `Users` group, in order for everyone to do anything within the database. Add the `Admin` user to the `Admins` group (for a database to be secure, the default `Admin` user can never be in the `Admins` group), and remove the password for the `Admin` user.

For each group, follow these steps:

1. **Select the group from the User/Group Name list.**
2. **Set the Object Type option to the Database type and, in the Permissions section of the dialog box, choose the check boxes next to those permissions you want to assign for the entire database.**

   Normally, only the `Admins` group has Administer permission for the database.
3. **Set the Object Type option to the Table type.**

   The Object Name box lists all the tables in the database.
4. **With <*New Tables/Queries*> selected, use the Permissions check boxes to set the default permissions you want this group of users to have for any new objects of that type.**

   Setting default permissions saves having to set them for each new object that you create later. Refer to Table 3-2 for what the permissions mean for this type of object.
5. **Select each object in turn, and set the permissions that you want this group to have for this object.**
6. **Repeat Steps 3 through 5, setting the object type to the Query, Form, Report, and Macro types — one at a time.**
7. **Click OK to close the dialog box.**

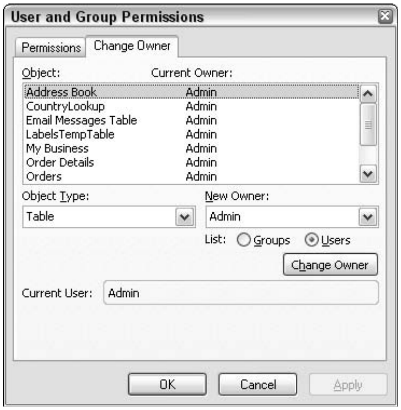
REMEMBER

The `Admins` group normally has all permissions for all objects — and you should probably leave it that way. Don't chance locking yourself out of your own database!

Displaying or changing an object's owner

The owner of an object has full permissions for that object, regardless of what other permissions you do or don't grant. You can see who owns any database object by looking at the Change Owner tab of the User and Group Permissions dialog box, shown in Figure 3-14.

To see an object's owner, set the Object Type option to the type of the object and find the object from the Object list — the owner's user name appears to its right. To change ownership, select the object, set the New Owner option to another user or group name, and click the Change Owner button.



User and Group Permissions

Permissions | Change Owner

Object:	Current Owner:
Address Book	Admin
CountryLookup	Admin
Email Messages Table	Admin
LabelsTempTable	Admin
My Business	Admin
Order Details	Admin
Orders	Admin

Object Type: Table

New Owner: Admin

List: ○ Groups ● Users

Change Owner

Current User: Admin

OK | Cancel | Apply

Figure 3-14: You can change the owner of any object in the database.

Securing your VBA modules

Before Access 2000, you used the same user-level security system to protect VBA modules that you use for the rest of your database objects. Starting with Access 2000, however, you've had to use a separate password to secure your VBA procedures.

To set a password for viewing or editing your VBA procedures, follow these steps:

1. **Choose Database Tools➪Macro➪Visual Basic (or press Alt+F11).**

   You see the Microsoft Visual Basic window, which we describe in Book VIII.

2. **Click the Office Button. In the resulting dialog box, choose Manage➪Database Properties.**

   You see the Project Properties dialog box.

3. **Click the Protection tab, and type the same password in the Password and Confirm Password text boxes.**

4. **Click OK.**

   To remove the password, follow the same steps but delete the entries in the Password and Confirm Password text boxes.

Securing front-end and back-end databases

If you split your Access application into a front end and a back end (as described in Chapter 2 of this minibook), how do you secure it? After all, you need to secure both databases. No problem; follow these steps:

1. **Secure both the front-end and back-end databases, using the same workgroup.**
2. **Create users and groups.**
3. **In the back end, grant permissions to groups to view and/or edit the records.**

   Users access only the tables in the back-end database. What permissions they have for other database objects doesn't matter.
4. **In the front end, grant Open/Run permission to all groups for the Database object. Also grant groups permission to use the appropriate forms and reports.**

Not granting any permissions in the back-end database is another approach. Instead, create queries in the front-end database that include tables in the back-end database, and you set the `RunPermissions` property of each query to provide the needed permissions — search for `RunPermissions` in Access Help for more information.

Book VIII

Programming in VBA

The 5th Wave By Rich Tennant

" Once I told Mona that Access was an 'argument' based program, she seemed to warm up to it."

Contents at a Glance

Chapter 1: What the Heck Is VBA?

In This Chapter

- **Understanding Visual Basic for Applications (VBA)**
- **Using the Visual Basic Editor**
- **Discovering code as you go**

Visual Basic for Applications — often abbreviated *VBA* — is a programming language you can use to extend the functionality of Microsoft Access and other products in the Microsoft Office suite of programs. A *programming language* is a means of writing instructions for the computer to *execute* (perform). Programmers often refer to the written instructions as *code* because the instructions aren't in plain English. Rather, they're in a code that the computer can interpret and execute.

You can create sophisticated Access databases without using VBA at all. In most cases, the other objects offered by Access — tables, queries, forms, reports, and macros — offer more than enough flexibility and power to create just about any database imaginable. But once in a while, you come across a situation where you want to do something that none of those other objects can do. That's where VBA comes in. If you can find no other way to accomplish some goal in Access, writing code is usually the solution.

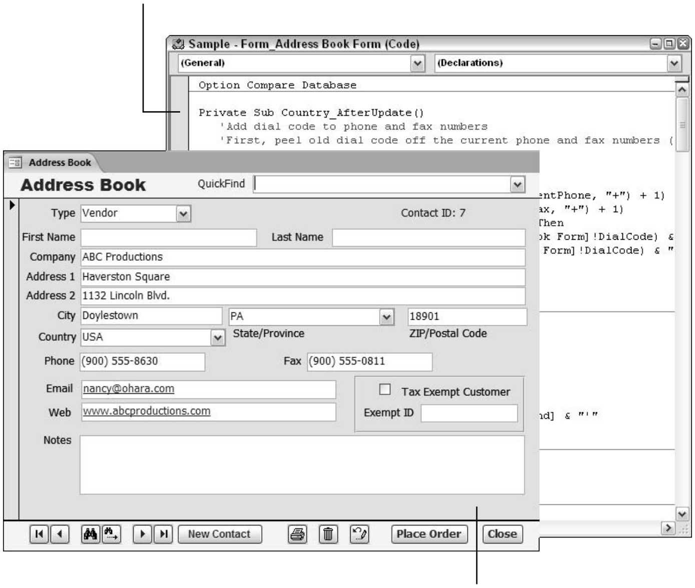
Finding VBA Code

So what the heck is VBA code, anyway? To the untrained eye, VBA code looks like gibberish — perhaps some secret code written by aliens from another planet. But to Access, the code represents very specific instructions on how to perform some task.

Within any given database, Access stores code in two places:

- **Class modules (Code-Behind Forms):** Every form and report you create automatically contains a *class module* (also called a *code-behind form*), as illustrated in Figure 1-1. The class module for a given form or report is empty unless you place controls that require VBA code on that form or report.

Class module (Code Behind Form)



```
Option Compare Database

Private Sub Country_AfterUpdate()
    'Add dial code to phone and fax numbers
    'First, peel old dial code off the current phone and fax numbers (
```

```
entPhone, "+") + 1)
ax, "+") + 1)
Then
ok Form]!DialCode) &
 Form]!DialCode) & "
```

```
nd] & "'"
```

Address Book QuickFind

Type	Vendor	Contact ID: 7	
First Name		Last Name	
Company	ABC Productions		
Address 1	Haverston Square		
Address 2	1132 Lincoln Blvd.		
City	Doylestown	State/Province: PA	ZIP/Postal Code: 18901
Country	USA		
Phone	(900) 555-8630	Fax	(900) 555-0811
Email	nancy@ohara.com	□ Tax Exempt Customer	
Web	www.abcproductions.com	Exempt ID	
Notes			

Form

Figure 1-1: Every form and report has a class module behind it.

- **Standard modules:** Code can also be stored in *standard modules.* Code in standard modules is accessible to all objects in your database, not just a single form or report.

Opening a class module

If you want to view or change the code for a form or report's class module, first open, in Design view, the form or report to which the module is attached. Then click the View Code button, shown near the mouse pointer in Figure 1-2.

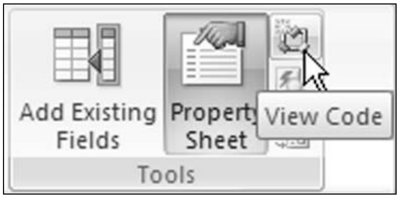
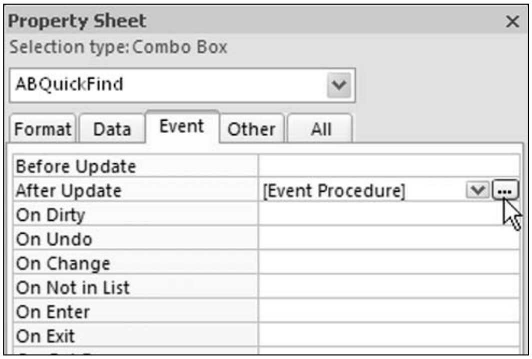


Figure 1-2: The View Code button.

You can also get to a class module from the Event tab of the Property sheet in the Design View window. The Property sheet allows you to zoom right in on the VBA code that's associated with a given control. For example, some controls contain code created by wizards. When you click such a control and then click the Events tab in the Property sheet, the property value chose `[Event Procedure]`. When you click `[Event Procedure]`, you see a button with three dots, like the one near the mouse pointer in Figure 1-3. That's the Build button. Click it to see the code that executes in response to the event.



Selection type: Combo Box

ABQuickFind

Before Update	
After Update	[Event Procedure]
On Dirty	
On Undo	
On Change	
On Not in List	
On Enter	
On Exit	

Figure 1-3: Look for the code that executes in response to the event.

To write custom code for a control, select the control in Design view, open the Property sheet, click the Event tab, click the event to which you want to attach some custom code, click the Build button, and then choose Code Builder.

After you open a module, you're taken to an entirely separate program window called the *Visual Basic Editor,* where you see the module in all its glory.

Creating or opening a standard module

Standard modules contain VBA code that isn't associated with a specific form or report. The code in a standard module is available to all tables, queries, forms, reports, macros, and other modules in your database. You won't see Module as an option when you're viewing All Access Objects in the shutter bar until you create at least one standard module. You have to go looking for options to create and work with modules.

To create a new module, click the Create tab. Then click the arrow under the Macros button and choose Module (Figure 1-4). The Visual Basic Editor opens.

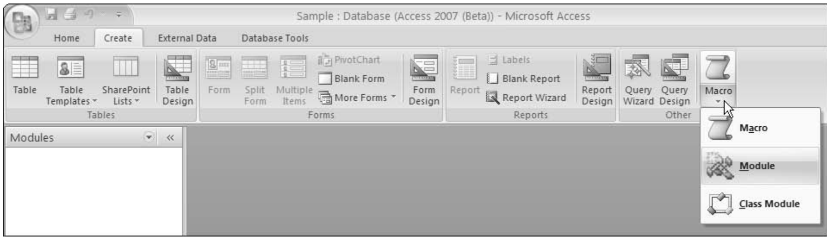


Figure 1-4: Create a new module.

Standard modules don't show up automatically in the shutter bar, not even when you're viewing all Access object types. To view standard modules in your database, you have to click the drop-down button and choose Modules, as in Figure 1-5. If you've already created and saved a standard module, you can open it by double-clicking its name. If the current database contains no standard Modules, you won't even see Modules as a category.

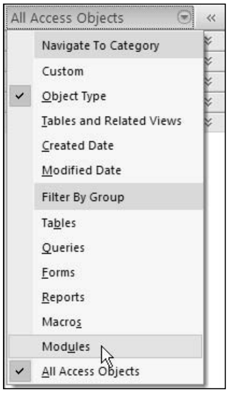


Figure 1-5: Open a pane to see standard modules.

Regardless of whether you create or open a module, you end up in the Visual Basic Editor. The editor is a completely separate program with its own taskbar button. The editor retains the old-style Windows look and feel. We cover that in more detail in a moment. For now, keep in mind that you can close the Visual Basic Editor and return to Access at any time. Just click the Close (X) button in the Editor's upper-right corner.

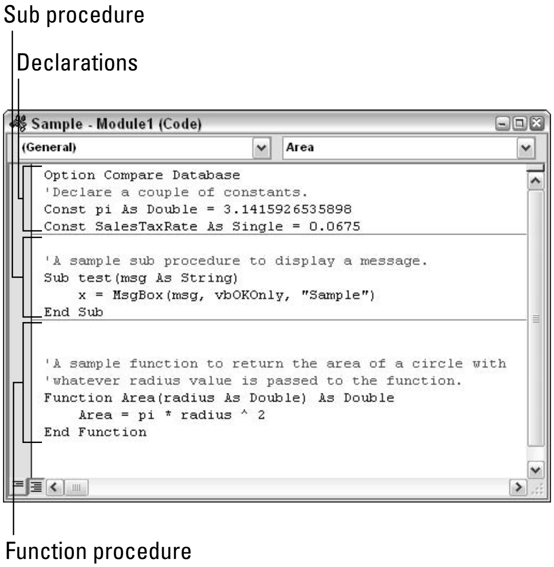
Enabling VBA Code

Like any programming language, people can use VBA to create code that does good things or code that does bad things. Whenever you open a database that contains code, Access displays a warning in the Security bar. The warning doesn't mean that there's "bad code" in the database; it just means that there *is* code in the database. Access has no way of determining whether the code is beneficial or malicious. That's a judgment call only a human can make.

If you trust the source of that code, you have to click the Enable Content button to make the code executable. Otherwise, the code is disabled, as are many features of the Visual Basic Editor.

How code is organized

All modules organize their code into a `Declaration` section at the top, followed by individual procedures, as shown in Figure 1-6. The `Declaration` section contains options, written in code format, that apply to all procedures in the module. Each procedure is also a chunk of VBA code that, when executed, performs a specific set of steps.



```
Option Compare Database
'Declare a couple of constants.
Const pi As Double = 3.14159265358979
Const SalesTaxRate As Single = 0.0675

'A sample sub procedure to display a message.
Sub test(msg As String)
    x = MsgBox(msg, vbOKOnly, "Sample")
End Sub


'A sample function to return the area of a circle with
'whatever radius value is passed to the function.
Function Area(radius As Double) As Double
    Area = pi * radius ^ 2
End Function
```

Figure 1-6: Modules consist of declarations and procedures.

Procedures in a module fall into two major categories: sub procedures and function procedures. Both types of procedures use VBA code to perform some task. The next sections outline some subtle differences in how and where they're used.

Sub procedures

A *sub procedure* is one or more lines of code that make Access perform a particular task. Every sub procedure starts with the word `Sub` (or `Private Sub`) and ends with `End Sub`, using one of the following general structures:

```
Sub name()
   ...code...
End Sub

Private Sub name()
   ...code...
End Sub
```

`name` is the name of the procedure, and `...`*`code`*`...` is any amount of VBA code.

Text that appears to be written in plain English within a module represents *programmer comments* — notes for other programmers. The computer ignores the comments. Every comment starts with an apostrophe (`'`).

Function procedures

A *function procedure* is enclosed in `Function...End Function` statements, as the following code shows:

```
Function name()
   <...code...>
End Function
```

Unlike a sub procedure, which simply performs some task, a function procedure performs a task and returns a value. In fact, an Access function procedure is no different from any of the built-in functions you use in Access expressions. And you can use a custom function procedure wherever you can use a built-in procedure.

Using the Visual Basic Editor

Regardless of how you open a module, you end up in the Visual Basic Editor. The Visual Basic Editor is where you write, edit, and test your VBA code. The Visual Basic Editor is entirely separate from the Access program window. If you click outside the Visual Basic Editor window, the window may disappear as whatever window you clicked comes to the front.

The Visual Basic Editor retains the view it had in previous versions of Access. There is no Ribbon or shutter bar. In fact, the Visual Basic Editor is virtually identical to Microsoft's *Visual Studio,* the IDE (Integrated Development Environment) used for all kinds of programming with Microsoft products.

Like all program windows, the Visual Basic Editor has its own Windows taskbar button, as shown in the top half of Figure 1-7. If the taskbar is particularly crowded with buttons, the editor and Access may share a taskbar button, as in the bottom half of Figure 1-7. If you suddenly lose the VBA Editor window, click its taskbar button to bring the window back to the top of the stack of program windows on your desktop.

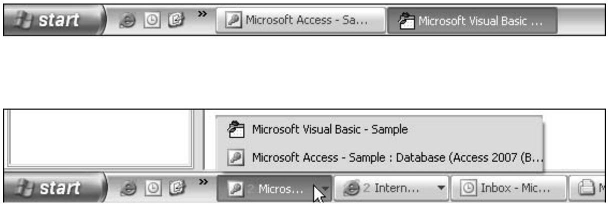

start
Microsoft Access - Sa...
Microsoft Visual Basic ...
Microsoft Visual Basic - Sample
Microsoft Access - Sample : Database (Access 2007 (B...
start
2 Micros...
2 Intern...
Inbox - Mic...

Figure 1-7: Taskbar buttons for Access and the Visual Basic Editor.

In most versions of Windows, you can right-click the Windows taskbar and choose the Tile Windows Vertically option from the shortcut menu to make all open program windows visible on-screen without overlap.

Talkin' the talk

Programmers have their own slang terms to describe what they do. For example, the term *code,* which refers to the actual instructions written in a programming language, is always singular, like the terms *hardware* and *software.* You don't add *hardwares* and *softwares* to your computer system. You add hardware and software. Likewise, you never write, or cut and paste code*s.* You write, or cut and paste, code.

The term GUI (pronounced *goo*-ey) refers to Graphical User Interface. Anything you can accomplish by using a mouse (that is, without writing code) is considered part of the GUI. You create tables, queries, forms, reports, data access pages, and macros using the GUI. You only need to write code in modules.

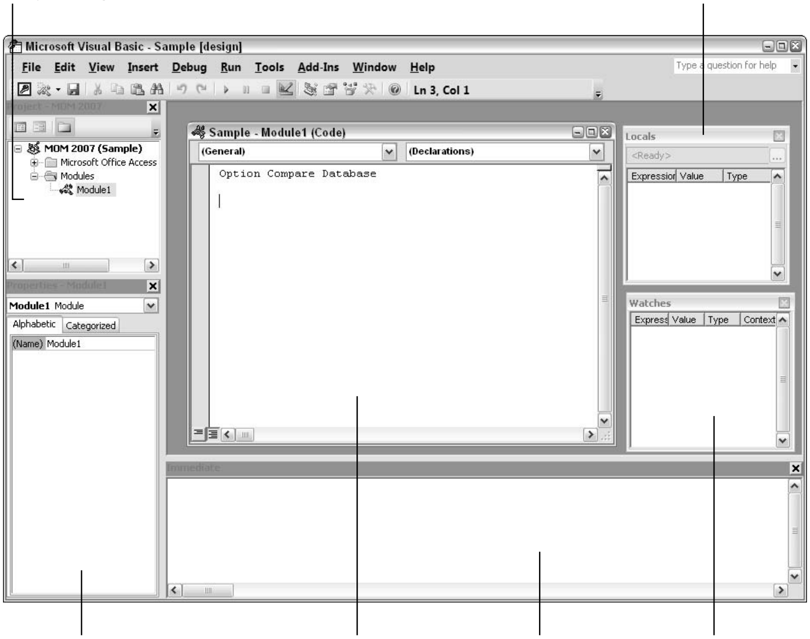
A database may be referred to as an *app,* which is short for *application.* If a programmer says, "I created most of the app with the GUI; I hardly wrote any code at all," he means he spent most of his time creating tables, queries, forms, reports, data access pages, and macros — using the mouse — and relatively little time typing code in VBA.

The Visual Basic Editor provides many tools designed to help you write code. Most of the tools are optional and can be turned on or off using the View menu in the Visual Basic Editor menu. The windows are shown in Figure 1-8. We provide more information on each of the optional windows when they become relevant to the type of code we're demonstrating. For now, knowing how to make them appear and disappear is sufficient.

You can move and size most of the windows in the Visual Basic Editor using standard methods. For instance, you can move most windows by dragging their title bars. You size windows by dragging any corner or edge. Most of the time, you won't need to have all those optional windows open to write code. Feel free to close any optional window open in your editor by clicking its Close (X) button. To open a window, choose View from the menu, and click the name of the window you want to open.

TIP

If you have multiple monitors connected to your computer, you can put the Access window on one monitor and the Visual Basic Editor window on the other.



```
Option Compare Database
```

Project Explorer

Locals window

Properties window

Code window

Immediate window

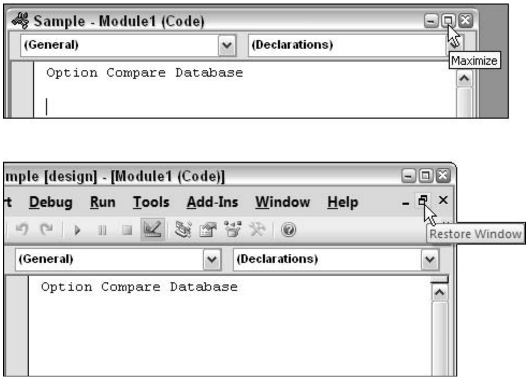
Watches window

Figure 1-8: Visual Basic Editor components.

Using the Code window

The Code window is where you type your VBA code. Similar to a word processor or text editor, the Code window supports all the standard Windows text-editing techniques. You can type text and use the Backspace and Delete keys on your keyboard to delete text. You can use the Tab key to indent text. You can select text by dragging the mouse pointer through it. You can copy and paste text to, and from, the Code window. In short, the Code window is a text editor.

The Code window acts like the document window in most other programs. Click its Maximize button, shown near the mouse pointer at the top of Figure 1-9, to enlarge it. To restore it to its previous size, click the Restore Window button, shown at the bottom of that same figure.



```
Option Compare Database
```

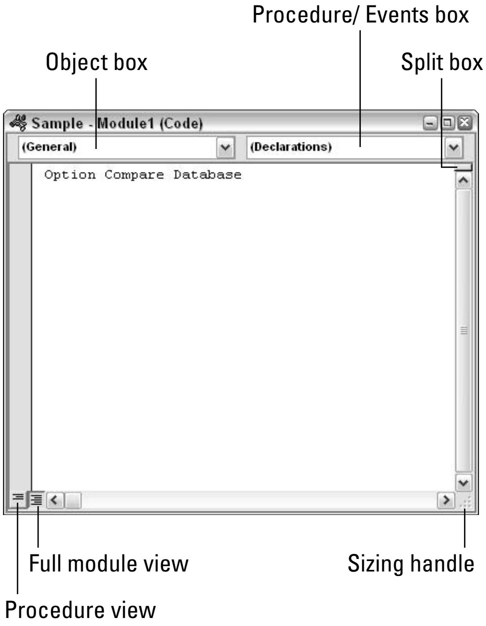
```
Option Compare Database
```

Figure 1-9: Code Windows Maximize and Restore Window buttons.

Tools in the Code window are pointed out in Figure 1-10 and summarized in the following list:

- **Object box:** When you're viewing a class module, this box shows the name of the object associated with the current code and allows you to choose a different object. In a standard module, only the word `General` appears because a standard module isn't associated with any specific form or report.
- **Procedure/Events box:** When you're viewing a class module, this box lists events supported by the object whose name appears in the Object box. When viewing a standard module, the Procedure/Events box lists the names of all procedures in that module. To jump to a procedure or event, just choose its name from the drop-down list.

- **Split bar:** This divvies up the screen for you. Drag the Split bar down to separate the Code window into two independently scrollable panes. Drag the Split bar back to the top of the scroll bar to unsplit the window.
- **Procedure view:** When clicked, it hides declarations, and only procedures are visible.
- **Full Module view:** When clicked, it makes declarations and procedures visible.
- **Sizing handle:** Drag it to size the window. (You can drag any corner or edge as well.)



```
Option Compare Database
```

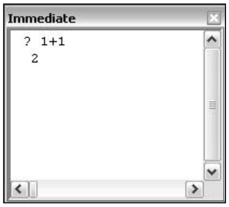
Figure 1-10: The Code window tools.

Using the Immediate window

The *Immediate window,* or *debug window,* in the Visual Basic Editor allows you to run code at any time, right on the spot. Use the Immediate window for testing and debugging (removing errors from) code. If the Immediate window isn't open in the Visual Basic Editor, you can bring it out of hiding at any time by choosing View➪Immediate Window from the editor's menu.

When the Immediate window is open, you can anchor it to the bottom of the Visual Basic Editor just by dragging its title bar to the bottom of the window. Optionally, you can make the Immediate window free-floating by dragging its title bar up and away from the bottom of the Visual Basic Editor program window. You can also dock and undock the Immediate window by right-clicking within the Immediate window and choosing the Dockable option from the shortcut menu that appears.

The Immediate window allows you to test expressions, run VBA procedures you create, and more. To test an expression, you can use the `debug.print` command, or the abbreviated `?` version, followed by a blank space and the expression. Which command you use doesn't matter, although obviously, typing the question mark is easier. You may think of the `?` character in the Immediate window as standing for *"What is . . . ?"* Typing `? 1+1` into the Immediate window and pressing Enter is like asking, "What is one plus one?" The Immediate window returns the answer to your question, `2`, as shown in Figure 1-11.



```
? 1+1
 2
```

Figure 1-11: The free-floating Immediate window solves 1 + 1 calculation.

If you see a message about macro content being blocked, switch over to the Access program window and click the Enable Content button on the Security bar.

If you want to re-execute a line that you already typed into the Immediate window, you don't need to type that same line in again. Instead, just move the cursor to the end of the line that you want to re-execute and press Enter. To erase text from the Immediate window, drag the mouse pointer through whatever text you want to erase. Then press the Delete (Del) key or right-click the selected text and choose the Cut option from the shortcut menu.

You see many examples of using the Immediate window in the forthcoming chapters of this book. For the purposes of this chapter, knowing the Immediate window exists and basically how it works is enough.

Do bear in mind that the Immediate window is just for testing and debugging. The Code window is where you type (or paste in) VBA code.

Using the Object Browser

VBA code can manipulate Access objects programmatically. Remember, everything in Access is an object — tables, forms, reports, and even a single control on a form or report are objects. Every Access object you see onscreen in Access is managed either interactively or programmatically. When you work with objects in the Access program window, using your mouse and keyboard, you use Access interactively. You do something with your mouse and keyboard and the object responds accordingly.

When you write code, you write instructions that tell Access to manipulate an object *programmatically,* without user intervention. You write instructions to automate some task that you may otherwise do interactively with mouse and keyboard. In order to manipulate an object programmatically, you write code that refers to the object by name.

All the objects that make up Access and the current database are organized into an *object model,* which comprises one or more object libraries. An *object library* is an actual file on your hard drive that provides the names of objects that VBA refers to and manipulates.

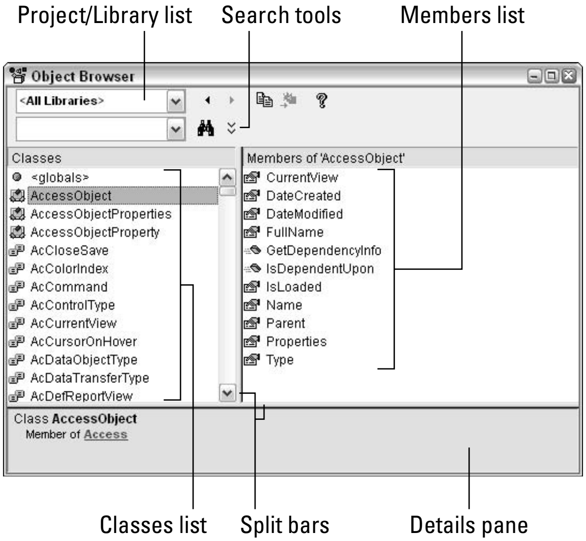
Each object consists of *classes*, where each class is a single programmable object. Each class has *members,* and some members are *properties*. Properties are characteristics of the class, such as its name, or the number of items it contains. Other members are *methods,* which expose things you can do to the class programmatically.

The object model is huge and contains many libraries and classes. There's no way to memorize everything in the object model. It's just too darn big. The Visual Basic Editor provides an Object Browser that acts as a central resource for finding things as well as getting help with things in the model. It's especially useful for deciphering other peoples' code, like the examples you'll see in this book.

To view the objects that VBA can access, follow these steps to open the Object Browser:

1. **Make sure you're in the Visual Basic Editor.**
2. **Click the Object Browser button in the toolbar, choose View➪Object Browser from the menu, or press the F2 key.**

The Object Browser opens. Figure 1-12 shows the Object Browser and points out some of the major features of its window. The following list describes each component:



Classes

- <globals>
- AccessObject
- AccessObjectProperties
- AccessObjectProperty
- AcCloseSave
- AcColorIndex
- AcCommand
- AcControlType
- AcCurrentView
- AcCursorOnHover
- AcDataObjectType
- AcDataTransferType
- AcDefReportView

Members of 'AccessObject'

- CurrentView
- DateCreated
- DateModified
- FullName
- GetDependencyInfo
- IsDependentUpon
- IsLoaded
- Name
- Parent
- Properties
- Type

Class **AccessObject**
Member of Access

Figure 1-12: The Object Browser.

- ✦ **Project/Library list:** This allows you to choose a single library or project to work with, or `<All Libraries>`.
- ✦ **Search tools:** Use these tools to help you find information in the libraries.
- ✦ **Classes list:** This shows the names of all classes in the currently selected library or project name (or all libraries).
- ✦ **Members list:** When you click a name in the Classes list, this pane shows the members (properties, methods, events, functions, objects) that belong to that class.
- ✦ **Details pane:** When you click a member name in the Members list, the Details pane shows the syntax for using the name as well as the name of the library to which the member belongs. You can copy text from the Details pane to the Code window.
- ✦ **Split bar:** Drag the Split bar left or right to adjust the size of the panes. (Drag any edge or corner of the Object Browser window to size the window as a whole.)

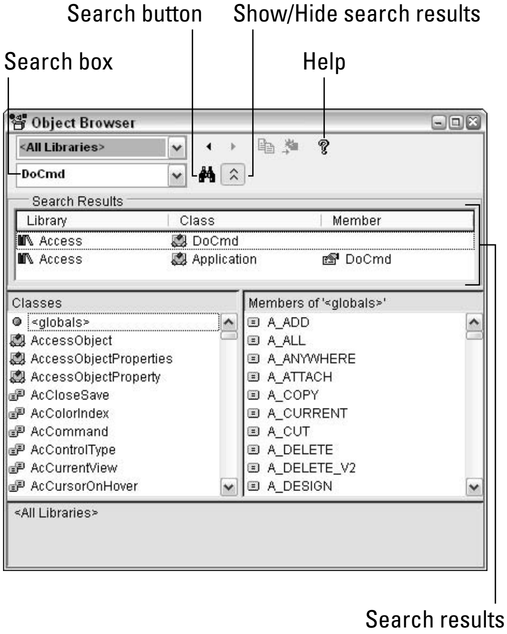
Searching the Object Library

For a beginning programmer, the sheer quantity of items in the Object Browser is daunting. However, learning about the pre-written code you pick up elsewhere is useful. Suppose you find and use a procedure that has a `DoCmd` object in it. You're wondering what this `DoCmd` thingy is.

You can search the Object Library for information about any object, including DoCmd, by following these steps:

1. **In the Object Browser, type the word you're searching for in the Search box.**

   In this example, type **DoCmd**, as shown in Figure 1-13.



DoCmd

Search Results

Library	Class	Member
Access	DoCmd	
Access	Application	DoCmd

Classes	Members of '<globals>'
<globals>	A_ADD
AccessObject	A_ALL
AccessObjectProperties	A_ANYWHERE
AccessObjectProperty	A_ATTACH
AcCloseSave	A_COPY
AcColorIndex	A_CURRENT
AcCommand	A_CUT
AcControlType	A_DELETE
AcCurrentView	A_DELETE_V2
AcCursorOnHover	A_DESIGN

<All Libraries>

Figure 1-13: Object Browser search tools.

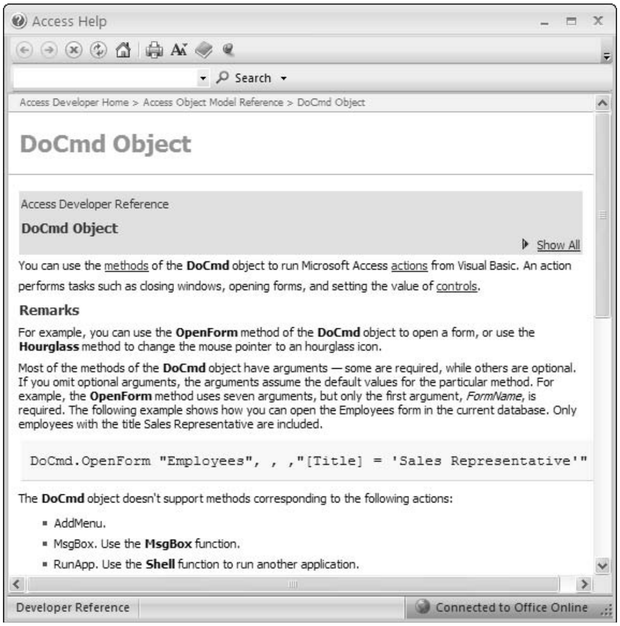
2. **Click the Search button.**

   The search results appear in the Search Results pane.

3. **Click the word you searched for.**

4. **Click the Help (question mark) button on the Object Browser toolbar.**

Figure 1-14 shows the Help window for the DoCmd object. For the absolute beginner, even the information in the Help text may be a bit advanced. However, as you gain experience and dig a little deeper into VBA, you'll find the Object Browser and Help windows useful for constructing references to objects, properties, and methods from within your code.



Access Developer Home > Access Object Model Reference > DoCmd Object

DoCmd Object

Access Developer Reference

DoCmd Object

You can use the methods of the **DoCmd** object to run Microsoft Access actions from Visual Basic. An action performs tasks such as closing windows, opening forms, and setting the value of controls.

Remarks

For example, you can use the **OpenForm** method of the **DoCmd** object to open a form, or use the **Hourglass** method to change the mouse pointer to an hourglass icon.

Most of the methods of the **DoCmd** object have arguments — some are required, while others are optional. If you omit optional arguments, the arguments assume the default values for the particular method. For example, the **OpenForm** method uses seven arguments, but only the first argument, *FormName*, is required. The following example shows how you can open the Employees form in the current database. Only employees with the title Sales Representative are included.

```
DoCmd.OpenForm "Employees", , ,"[Title] = 'Sales Representative'"
```

The **DoCmd** object doesn't support methods corresponding to the following actions:

- AddMenu.
- MsgBox. Use the **MsgBox** function.
- RunApp. Use the **Shell** function to run another application.

Figure 1-14: Help for the `DoCmd` object.

Referring to objects and collections

Objects in the object model all have a syntax that works like this: You start with the largest, most encompassing object, and work your way down to the most specific object, property, or method. Sort of like a path to a filename, as in `C:\My Documents\MyFile.doc`, where you start with the largest container (disk drive `C:`), down to the next container (the folder named `My Documents`), and then to the specific file (`MyFile.doc`).

For example, the `Application` object refers to the entire Access program. It includes a `CurrentProject` object. If you were to look up the `CurrentProject` object in the Object Browser and view its Help window, you see `CurrentProject` houses several collections, including one named `AllForms`. The `AllForms` collection contains the name of every form in the current database.

The `AllForms` collection, in turn, supports a `Count` property. That property returns the number of forms in the collection. Say that you have a database open and that database contains some forms. If you go to the Immediate window and type

```
? Application.CurrentProject.AllForms.Count
```

and then press Enter, the Immediate window displays a number matching the total number of forms in the database.

At the risk of confusing matters, typing the following line in the Immediate window returns the same result:

```
? CurrentProject.AllForms.Count
```

The shortened version works because the `Application` option is the default parent object used if you don't specify a parent object before `CurrentProject`. (The `Application` object is the parent of `CurrentProject` because `CurrentProject` is a member of the `Application` object library.)

The bottom line is that when you see a bunch of words separated by dots in code (such as `CurrentProject.AllForms.Count`), be aware that those words refer to some object. In a sense, the words are a path to the object — going from the largest object down to a single, specific object, property, method, or event. You can use the Object Browser as a means of looking up the meanings of the words to gain an understanding of how the pre-written code works.

As you gain experience, you can use the Object Browser to look up information about objects, collections, properties, methods, events, and constants within your code. For now, consider the Object Browser as a tool for discovering VBA as you go.

Choosing object libraries

Most likely, the object libraries that appear automatically in the Object Browser's Project/Library drop-down list are all you need. However, should a given project require you to add some other object library, follow these steps to add it:

1. **Choose Tools➪References from the Visual Basic Editor main menu.**

   The References dialog box opens.

2. **Choose any library name from the list.**

   In the unlikely event that you need a library that isn't in the list — but you know you stored it on your hard drive — click the Browse button, navigate to the folder that contains the object library you need, click its name, and then click the Open button.

3. **Click OK when the object libraries you need have check marks.**

   The Project/Library list in the Object Browser now includes all the libraries you selected in the References dialog box.

Closing the Visual Basic Editor

When you're done working in the Visual Basic Editor, you can close it by using whichever of the following techniques is most convenient for you:

- Choose File➪Close and return to Microsoft Access from the Visual Basic Editor main menu.
- Click the Close button in the upper-right corner of the Visual Basic Editor program window.
- Right-click the Visual Basic Editor button on the taskbar, and then choose the Close option from the shortcut menu.
- Press Alt+Q.

Access continues to run even after you close the Visual Basic Editor window.

Discovering Code as You Go

Most beginning programmers start by working with code they pick up elsewhere, such as code generated by code wizards, or code copied from a Web site. You can also create VBA code, without writing it, by converting any macro to VBA code.

Converting macros to VBA code

TIP

Any macro you create in Access can be converted to VBA code. Converting macros to code is easier than writing code from scratch. For example, say you need to write some code because a macro can't do the job. But a macro can do 90 percent of the job. If you create the macro and convert it to VBA code, 90 percent of your code is already written. You just have to add the other ten percent (which is especially helpful if you can't type worth beans).

CROSS-REFERENCE

See Book VI, Chapter 1 for how macros work and how to create them.

As an example, suppose you click the Create tab, click the last Other button, and then choose Macros, as in Figure 1-15, to create a new macro.

Then you create your macro. The macro can be as large or as small as you want. Figure 1-16 shows a small simple example of a macro that shows a message on the screen. After you create your macro, close and save it. For this example, say I saved the macro in Figure 1-16 with the name `TinyMacro`.

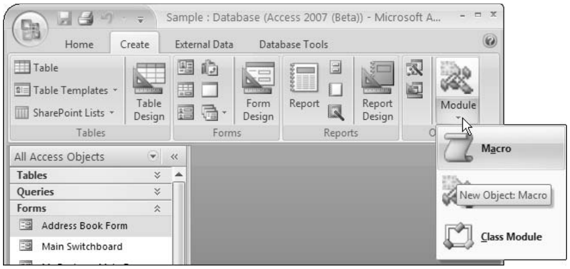
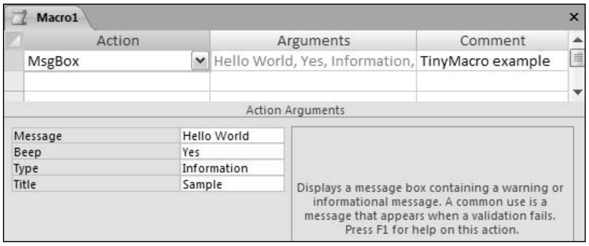


Figure 1-15: Create a new macro.


Macro1

Action	Arguments	Comment
MsgBox	Hello World, Yes, Information,	TinyMacro example

Action Arguments

Message	Hello World
Beep	Yes
Type	Information
Title	Sample

Displays a message box containing a warning or informational message. A common use is a message that appears when a validation fails. Press F1 for help on this action.

Figure 1-16: Sample `TinyMacro` macro.

When you convert a macro to VBA code, you actually convert all the macros in the macro group to code. Follow these steps for the basic procedure of converting macros to VBA:

1. **Choose Macros from the top of the Navigation Pane. Or choose All Access Objects and expand the Macros category.**
2. **Click the name of the macro you want to convert.**
3. **Click the Database Tools tab.**
4. **Click the Convert Macros to Visual Basic button shown at the mouse pointer in Figure 1-17.**

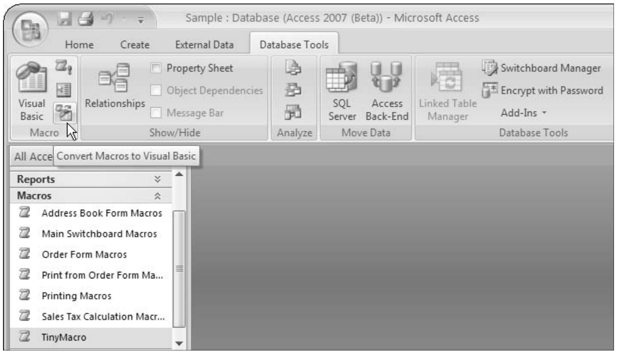


Figure 1-17: Convert Macros to Visual Basic button.

A dialog box appears, asking whether you want to include error-handling code or comments in the code. If you want to keep the code relatively simple, you can clear the first option and select only the second option.

5. **Click the Convert button and then click OK when your conversion is complete.**

To see the name of the converted macro, expand the Modules category as in Figure 1-18. The name of the module is `Converted Macro -` followed by the name of the macro you converted.

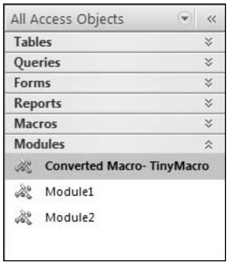
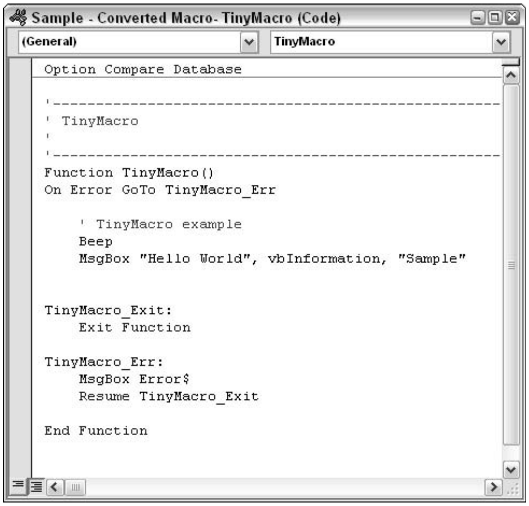


Figure 1-18: `TinyMacro` converted to module named `Converted Macro - Tiny Macro`.

To see the converted macro as VBA code, double-click its name. Like all VBA code, the code from the converted macro opens in the Visual Basic Editor Code window, as shown in Figure 1-19.



```
Option Compare Database

'------------------------------------------------------------
' TinyMacro
'
'------------------------------------------------------------
Function TinyMacro()
On Error GoTo TinyMacro_Err

    ' TinyMacro example
    Beep
    MsgBox "Hello World", vbInformation, "Sample"


TinyMacro_Exit:
    Exit Function

TinyMacro_Err:
    MsgBox Error$
    Resume TinyMacro_Exit

End Function
```

Figure 1-19: Converted macro in Code window.

Cutting and pasting code

Many VBA programmers post examples of code they've written on Web pages. When you come across some sample code you want to incorporate into your own database, retyping it all into the Visual Basic Editor is not necessary. Instead, just use standard Windows cut-and-paste techniques to copy the code from the Web page into the Visual Basic Editor.

Say you come across some code in a Web page you want to use in your own database. Here's the sequence:

1. **In the Web page, you drag the mouse pointer through the code you want to copy to select that code. Then press Ctrl+C to copy that selected code to the Windows Clipboard.**
2. **Back in Access, create a new module or open an existing module in which you want to place the code.**
3. **In the Code window, click at the position where you want to put the copied code. Then paste the code to the cursor position by pressing Ctrl+V.**

Bear in mind, however, that just pasting code into the Code window doesn't make the code do anything. Most code examples are based on a sample database. Just dropping the example into your database may not be enough to get it to work.

TIP

When you copy and paste from a Web page, you might get some HTML tags, weird characters, weird spacing, and so forth. If that happens, you can copy the code from the page and paste it into a simple text editor like Notepad first. That should get rid of any unusual tags and characters. Then copy and paste the text from the Notepad document into the VBA Editor's Code window.

But even if you do find an example that's generic enough to work in any database, the code won't actually do anything until some event in your database triggers it into action. We'll look at the many ways you can trigger code into action in the next chapter.

Chapter 2: Writing Code

In This Chapter

- Understanding VBA syntax
- Writing your own custom VBA procedures
- Running and testing your custom procedures

Writing VBA code is different from writing in English or some other human language. When you write in English, you're presumably writing to another human being who speaks the same language. If your English isn't so great (bad spelling, poor grammar), your recipient can probably still figure out what your message means. Humans have flexible brains that can figure things out based on context.

Not so for computers. Computers don't have brains and can't figure out anything based on context. When you write code, the computer does exactly what the code tells it to do. If the computer can't read and process a statement, the procedure stops running and an error message appears on-screen.

Before you start writing your own custom code, you need to know about syntax and also the resources available for finding the syntax for the tasks you want to program. And you need to know at least some basic techniques for testing your code to see whether it's going to work — before you try putting it to use.

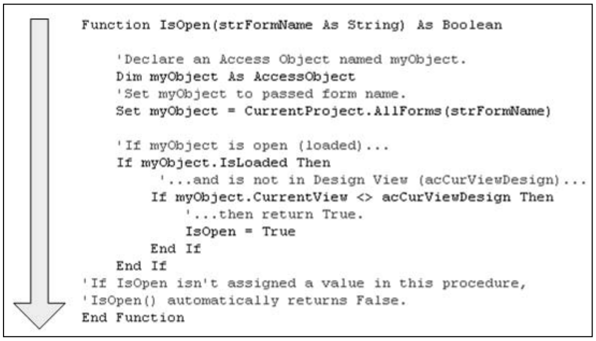
How VBA Works

VBA code is organized into procedures. Each procedure contains any number of lines of code called *statements.* Each statement instructs VBA to perform some action. The procedure sits in its module, doing nothing, until some event calls the procedure.

When a procedure is called, each statement *executes* (runs) one at a time. VBA fully executes the first statement, then fully executes the second statement, and so forth, until the `End Sub` or `End Function` statement, which marks the end of the procedure. At that point, the code stops executing. Figure 2-1 summarizes how procedures work.

TECHNICAL STUFF

The top-to-bottom flow of execution can be altered using loops and decision-making code, as we describe in Chapter 3 of this minibook.



```
Function IsOpen(strFormName As String) As Boolean

    'Declare an Access Object named myObject.
    Dim myObject As AccessObject
    'Set myObject to passed form name.
    Set myObject = CurrentProject.AllForms(strFormName)

    'If myObject is open (loaded)...
    If myObject.IsLoaded Then
        '...and is not in Design View (acCurViewDesign)...
        If myObject.CurrentView <> acCurViewDesign Then
            '...then return True.
            IsOpen = True
        End If
    End If
'If IsOpen isn't assigned a value in this procedure,
'IsOpen() automatically returns False.
End Function
```

Figure 2-1: Code execution from top to bottom.

VBA Syntax

Each statement within a procedure must follow strict rules of syntax. You can't just write text that looks like VBA code. All languages, including English and VBA, have rules of syntax. Rules of *syntax* define the order in which words must be placed so a statement makes sense. For example, the following sentence — which is English, by the way, and not VBA — doesn't make sense because grammar rules are broken (similar to the way they're mangled in some of those e-mails we get):

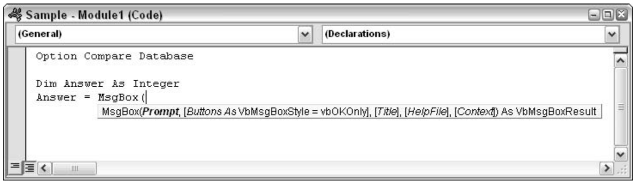
moon the yapped sullen dog at irritating the.

If we rearrange the letters and words of that sentence so they follow the correct rules of syntax for the English language, the sentence makes sense:

The irritating dog yapped at the sullen moon.

The rules of VBA syntax are more rigid than the rules of human language. Even the slightest misspelling or missing punctuation mark causes a statement to fail.

Most statements start with a *keyword*, which is a word that has a specific meaning in VBA. As soon as you type a complete keyword you typically see a brief Quick Info *syntax chart* for the keyword. Figure 8-2 shows an example. If you don't see the syntax chart, you can right-click the keywords and choose Quick Info.



```
Option Compare Database

Dim Answer As Integer
Answer = MsgBox (
```

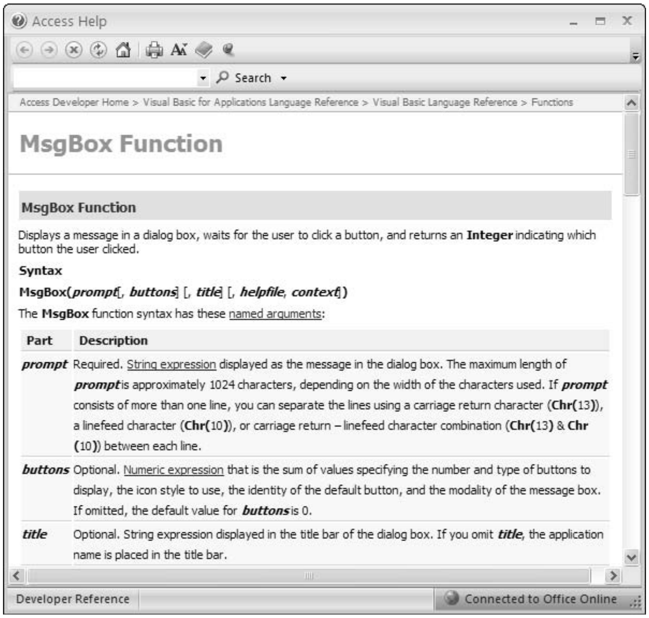
MsgBox(***Prompt***, [*Buttons As* VbMsgBoxStyle = vbOKOnly], [*Title*], [*HelpFile*], [*Context*]) As VbMsgBoxResult

Figure 2-2: A Quick Info syntax chart.

The Quick Info syntax chart doesn't give you any details. Instead, it just guides you through typing the entire statement according to the syntax rules. For detailed information on each item in the syntax chart, you have to look in the Help. There are several ways to get to the help for a keyword:

- Type the keyword in the Type a Question for Help box in the upper-right corner of the VBA editor and then press Enter.
- Select the keyword in the Code window and press Help (F1).
- Search the Object Browser for the keyword and use its Help, as described in the previous chapter.

When you get to the help page, you see a description of what the keyword performs. You also see a syntax chart similar to the one in Quick Info, but you get a lot more information, too. You see the meaning of each part, acceptable values of each part, one or more examples, and perhaps links to related help pages. Figure 8-3 shows a small portion of the Help screen for the `MsgBox` keyword. Use the scroll bar at the right side of the window to scroll through it all.


Access Help
Search
Access Developer Home > Visual Basic for Applications Language Reference > Visual Basic Language Reference > Functions
Developer Reference
Connected to Office Online

MsgBox Function

MsgBox Function

Displays a message in a dialog box, waits for the user to click a button, and returns an **Integer** indicating which button the user clicked.

Syntax

MsgBox(*prompt*[, *buttons*] [, *title*] [, *helpfile*, *context*])

The **MsgBox** function syntax has these named arguments:

Part	Description
prompt	Required. String expression displayed as the message in the dialog box. The maximum length of ***prompt*** is approximately 1024 characters, depending on the width of the characters used. If ***prompt*** consists of more than one line, you can separate the lines using a carriage return character (**Chr(**13**)**), a linefeed character (**Chr(**10**)**), or carriage return – linefeed character combination (**Chr(**13**)** & **Chr(**10**)**) between each line.
buttons	Optional. Numeric expression that is the sum of values specifying the number and type of buttons to display, the icon style to use, the identity of the default button, and the modality of the message box. If omitted, the default value for ***buttons*** is 0.
title	Optional. String expression displayed in the title bar of the dialog box. If you omit ***title***, the application name is placed in the title bar.

Figure 2-3: Help for the `MsgBox` keyword.

The most important things to know about the syntax charts are quick to list:

- In the Quick Info syntax chart, boldface indicates the part you're about to type.
- Items in square brackets are optional and can be omitted from the statement you're typing.
- Never type the square brackets into your statement.
- If you skip over an optional part, you must still type the comma.

Arguing with VBA

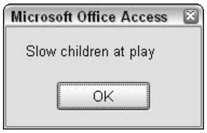
Each part that follows the keyword is generally referred to as an *argument.* Most arguments are actually expressions, similar to expressions used in calculated controls. A string expression can be a literal string enclosed in quotation marks (such as `"Smith"` or `"Jones"`), or the name of a field — or, for that matter, the name of a variable (as described in the next chapter of this book) that contains a string, such as `[LastName]` (which refers to a field in a table).

A numeric expression can be anything that results in a valid number. For example, 10 is a valid numeric expression, as is 2*5 (two times five), as is the name of a field or variable that contains a number.

Given all this information, take a look at some `MsgBox` statements that follow the rules of syntax and are considered valid:

```
MsgBox("Slow children at play")
```

The preceding statement is valid because the one-and-only required named argument — the `Prompt` argument — is included. When executed, the `MsgBox()` statement displays that prompt as shown in Figure 2-4.



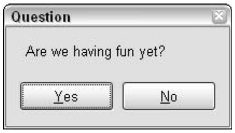
Slow children at play

Figure 2-4: Result of `MsgBox` statement.

As you scroll through the Help for the `MsgBox` function, you find there are many ways to use it. For example, the following statement is perfectly valid syntax for the `MsgBox` keyword, where `vbYesNo` is the setting that tells the box to display Yes and No buttons — and replaces the placeholder text buttons in the `MsgBox` syntax chart — and `"Question"` is literal text that appears in the title bar of the message box (and replaces the placeholder text title in the same chart).

```
x = MsgBox ("Are we having fun yet?",vbYesNo,"Question")
```

That variation displays the message shown in Figure 2-5 and stores the user's answer to the question in a variable named `x`. (We talk about variables in the next chapter.)



Question

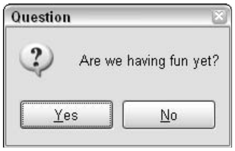
Are we having fun yet?

Figure 2-5: Result of `MsgBox` function with three arguments.

You can combine two or more options for the Buttons argument using a plus sign. For example, the preceding `MsgBox` statement uses the `vbYesNo` and `vbQuestion` constants to specify that the box show a question mark icon as well as the Yes/No buttons:

```
x= MsgBox ("Are we having fun yet?",vbYesNo+vbQuestion, "Question")
```

When executed, the above statement shows the box in Figure 2-6. Unlike the previous example, this new box shows a question mark icon because of the `+vbQuestion` added to the second argument.



Question

Are we having fun yet?

Figure 2-6: `MsgBox` with a question mark icon.

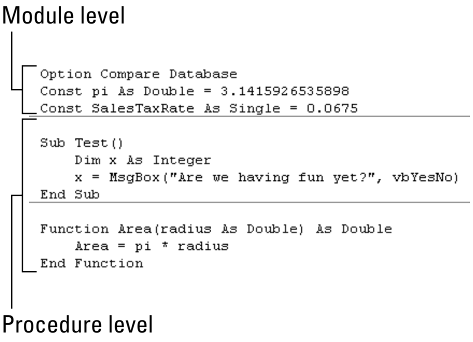
Although you have some flexibility in how you express values for arguments, you have almost no flexibility in terms of the order in which you place the arguments within a statement. For example, if you want to use just the first and third arguments in a syntax chart, such as the `Prompt` and `Title` arguments of the `MsgBox` function, you still need to include a comma for the second argument to make clear that the last argument is the title, as in the following example:

```
x = MsgBox("Howdy",,"I am the Title")
```

The first comma after the `"Howdy"` prompt shows the start of the second argument. No argument shows between the two commas because you're not using that argument. The second comma then shows that the next argument is actually the third one, `Title` (hence the text, `"I am the Title"` appears in the title bar of the message box). Because there is no value for the Buttons argument, the box shows only the default OK button.

Module level versus procedure level

As you work with the VBA Help windows and syntax charts, you often come across the terms *module level* and *procedure level.* These terms refer to the location of code within the module. Simply stated, anything that's defined near the top of the module above the first `Function` or `Sub` procedure is a module-level declaration. Anything defined within a procedure is said to be defined at the procedure level, as illustrated in Figure 2-7.



```
Option Compare Database
Const pi As Double = 3.1415926535898
Const SalesTaxRate As Single = 0.0675

Sub Test()
    Dim x As Integer
    x = MsgBox("Are we having fun yet?", vbYesNo)
End Sub

Function Area(radius As Double) As Double
    Area = pi * radius
End Function
```

Figure 2-7: Module level and procedure level.

All procedures that you add to a module should be placed below the declarations section of the module. When you see one or more `Option` statements at the top of a module, make sure that any procedures you add to the module start below all the `Option` statements at the top of the module.

Declaring Module Options

When you create a new standard module, it has just one declaration at the top. Typically it reads `Option Compare Database`, which doesn't even seem to make any sense. And frankly, changing or deleting that is extremely unlikely. However, the declaration actually has meaning.

The word `Option` tells the VBA to set an option. The specific option to set is the `Compare` option. The `Compare` option tells VBA what rules to use when comparing values. The word `Database` means to use the same rules that the rest of the database uses when comparing values. Using the same rules is always a good idea because otherwise things could get very confusing. However, the other two possible settings are the `Binary` and `Text` options:

- **Option Compare Binary:** When comparing strings, uppercase letters are considered to be smaller than lowercase letters. (With `Option Compare Database`, uppercase and lowercase letters are considered equal.)
- **Option Compare Text:** The sort order of your system's *locale* (the country and spoken language of your location) is used to compare strings. This option may be useful when creating a database that's used in non–English-speaking countries.

Writing Your Own VBA Procedures

All the code you write will be contained within procedures. A *procedure* is a single chunk of code that performs a series of actions when called. A sub procedure always begins with a `Sub` statement or a `Private Sub` statement, and ends with an `End Sub` statement. A function procedure begins with a `Function` statement and ends with an `End Function` statement. You can add new procedures to class modules or standard modules. How you do so depends on where you want to place the procedure.

Creating a new standard procedure

A procedure in a standard module is available to all Access objects and isn't tied to any particular control or event. To create a new procedure in a standard module

1. **Create a new standard module as described in Book VIII, Chapter 1.**

   or

   Open an existing module by double-clicking its name in the shutter bar.

2. **Choose Insert⇨Procedure from the Visual Basic Editor menu.**

   The Add Procedure dialog box opens, as shown in Figure 2-8.

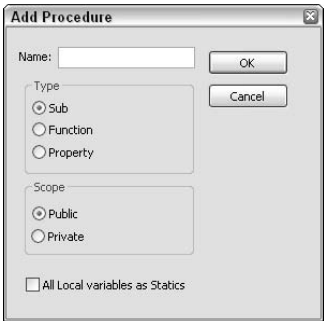


Figure 2-8: Add Procedure dialog box.

3. **Type a name for the procedure in the Name box.**

   The name can be anything you choose but must start with a letter and cannot contain any blank spaces.

4. **Under Type, choose Sub to create a sub procedure or Function to create a function procedure.**

   The Property option in the Type list has to do with creating custom objects, which isn't relevant to the topic at hand.

5. **Choose either the Public procedure type (to make the procedure available to all Access objects) or the Private procedure type (to make the procedure visible only to the current module) in the Scope section.**

   If you're not sure whether to choose the Public procedure or the Private procedure, choose Public.

   Private procedures are generally used only in class modules, not standard modules.

6. **Select the All Local Variables as Statics check box if you want to ensure that variables in the procedure retain their values between calls.**

   If you're not sure what to do with the All Local Variables as Statics option, your best bet is to leave it unselected.

7. **Click OK in the Add Procedure dialog box.**

   You see a new, empty procedure in the Code window.

If you chose the Function procedure type, the procedure looks something like this:

```
Public Function name()
End Function
```

If you chose the Sub procedure type, the code looks something like this:

```
Public Sub name()
End Sub
```

where `name` is the name you typed into the Add Procedure dialog box.

Creating a procedure through the Add Procedure dialog box is not really necessary. You can just type the `Function` statement or `Sub` statement into the Code window, and VBA automatically adds a corresponding `End Function` or `End Sub` statement.

The statements that the Add Procedure dialog box adds to the module use only the bare minimum of optional arguments supported by the `Function` and `Sub` statements. Depending on what the procedure does, you may need to define some additional arguments, as discussed in the section, “Passing arguments to procedures,” later in this chapter.

Creating a new event procedure

Recall that an event procedure is already tied to some event, such as clicking a button on a form. If you want to create a new event procedure for a control on a report or form, follow these steps:

1. **In Design view, open the form or report that contains the control for which you want to create a new procedure.**

   In the Database window, right-click the object’s name and choose Design View.

2. **Select the control for which you want to create a procedure.**

3. **Click the Event tab in the Property sheet.**

   If the Property sheet isn’t open, right-click the selected control, choose the Properties option from the shortcut menu to see its properties, and then click the Event tab.

4. **Click in the event that should trigger the procedure into action and then click the Build (…) button that appears.**

   For example, if the selected control is a button and you want a user to click that button to trigger the procedure into action, click in the `On Click` event and then click its Build button.

   The Choose Builder dialog box opens.

5. **Click the Code Builder button and then click OK.**

   The class module for the form or report opens in the Visual Basic Editor, with the cursor resting in a new procedure.

The name of the new procedure is a combination of the control's name and the event that triggers the procedure into action. The name is one that appears at the top of the All tab in the Property sheet. For example, if you right-clicked a button named `MyButton` and then built the procedure from the `On Click` event on the Event tab of the Property sheet, the procedure looks like this:

```
Private Sub MyButton_Click()

End Sub
```

Passing arguments to procedures

When you create your own expressions in Access, you often use built-in functions that are capable of accepting arguments. For example, there's a built-in `UCase()` function that takes any string of text as an argument. The argument is text or a number that you hand over to the function to operate on. The function does its thing on the argument and then returns the results.

To pass an argument to a built-in function, you place it in the parentheses after the function name. If you're passing a literal string, that string must be enclosed in quotation marks. For example, say you type the following into the Immediate window in the Visual Basic Editor:

```
? UCase("howdy world")
```

In this example, `UCase()` is the function and `"howdy world"` is the argument, the value being passed to the function. The `UCase()` function returns that same chunk of text with all the letters converted to uppercase, `HOWDY WORLD`.

When you create your own procedures, you can define what arguments, if any, the procedure is capable of accepting. If you create a function procedure, you can also define what the procedure returns. (A sub procedure doesn't return a value.)

What's with the simplified syntax?

Many of the optional arguments available in VBA statements represent very advanced concepts that are difficult to describe out of context. This book often shows a simplified version of the syntax for a given statement, focusing just on those arguments you either need to use or are likely to want to use. When you compare the simplified syntax shown in this book with the actual syntax shown in the Visual Basic Editor Help windows, the two may not be the same. Don't be alarmed. It's not a mistake.

Using the simplified syntax in this book allows you to discover VBA programming in a manner that focuses on the most basic — and most important — stuff first. You can work your way to the more advanced — and mostly optional — stuff as needed. The simplified syntax may well be all you ever need to use when writing your own code.

If you were to look at the syntax chart for the `Sub` statement, and take away some of the optional stuff from that chart, you see the syntax for the `Sub` statement looks something like this:

```
Sub name [(arglist)]
End Sub
```

The simplified syntax for the `Function` statement (with some of the optional stuff removed) looks similar, as the following:

```
Function name [(arglist)] As type
End Function
```

In both cases, the *`arglist`* is optional, as indicated by the square brackets. But even the optional *`arglist`* has a syntax, the simplified version of which is

```
name [As type]
```

where *`name`* is a name you make up. You can list multiple arguments by separating their names with commas.

The *`type`* component specifies the data type of the data. Like Access tables, VBA supports multiple data types. These data types are similar (but not identical) to data types defined for fields in the structure of a table. For example, the String data type in VBA is similar to the Text data type in an Access table, in that both contain text.

Table 2-1 lists the VBA data types that work best with Access. The Storage Size column shows how many bytes each data type assumes. The Declaration Character column shows an optional character used at the end of a name to specify a data type. For example, the name `PersonName$`, defines `PersonName` as containing a string. But in the real world, you really need not concern yourself too much with those columns. The first two columns in the table provide the information you really need to know.

Table 2-1 VBA Data Types

Data Type	*Acceptable Values*	*Storage Size*	*Declaration Character*
Boolean	True (–1) or False (0)	2 bytes	
Byte	0 to 255	1 byte	
Currency	–922,337,203,685,477.5808 to 922,337,203,685,477.5807	8 bytes	@
Date	January 1, 100 to December 31, 9999	8 bytes	
Double	–1.79769313486231E308 to –4.94065645841247E-324 for negative values; 4.94065645841247E-324 to 1.79769313486232E308 for positive values	8 bytes	#
Integer	–32,768 to 32,767	2 bytes	%
Long	–2,147,483,648 to 2,147,483,647	4 bytes	&
Object	Name of any object	4 bytes	
Single	–3.402823E38 to –1.401298E-45 for negative values; 1.401298E-45 to 3.402823E38 for positive values	4 bytes	!
String (fixed length)	Any text from 1 to 65,400 characters in length	10 + string length	$

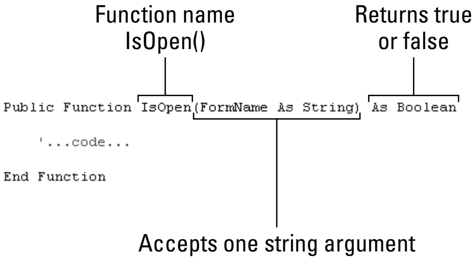
You define the names and data types of arguments within the parentheses that follow the name of the procedure. Separate the name from the data type using the word `As`. For example, the following `Sub` statement defines a sub procedure named `SampleSub()`. That sub procedure accepts two arguments: a single-precision number named `Amount` and a string named `Payee`:

```
Sub SampleSub(Amount As Single, Payee As String)
...code...
End Sub
```

Unlike a sub procedure, a function procedure can return a value. You define the data type of the returned value after the parentheses and the word `As`. The returned data doesn't need a name, just a data type. For example, the following `Function` statement defines a function procedure named `IsOpen()`. That function accepts one argument — a string. The name `FormName` refers to that passed string within the function. The function returns either a `True` or `False` value (the Boolean data type).

```
Function IsOpen(FormName As String) As Boolean

      ...code...
End Function
```

Don't bother to type either of the preceding procedures because they don't actually do anything. They just demonstrate the syntax of the `Sub` and `Function` statements. Figure 2-9 further points out the purpose of the various components of the sample `Function` statement.



```
Public Function IsOpen(FormName As String) As Boolean
    '...code...
End Function
```

Figure 2-9: Components of a sample function procedure.

Returning a value from a function

Any function can return a value. To define the value that a function returns, you use the following syntax within the body of the function:

```
functionName = value
```

where *`functionName`* is the name of the function and *`value`* is the value that the function returns. The following function is an example:

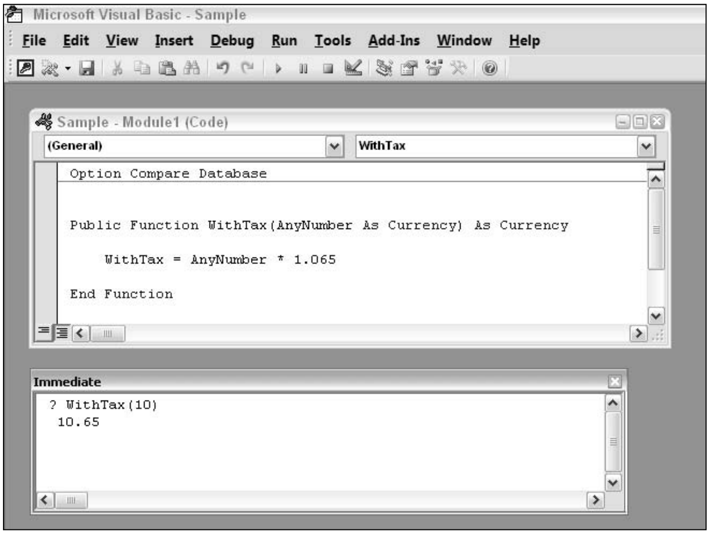
```
Function WithTax(AnyNumber As Currency) As Currency
   WithTax = AnyNumber * 1.065
End Function
```

Multiplying a number by 1.065 is equivalent to adding 6.5 percent sales tax to that number. Do this little trick with any sales tax rate. For example, to add 7.75 percent sales tax, you would multiply by 1.0775.

The `WithTax()` function is a complete VBA procedure that actually works. If you type it into a standard module you can use it anywhere in your database just as you would a built-in function. You could even test it out in the Immediate window. For example, after you type the `WithTax` function into the Code window, you can type the following into the Immediate window and press Enter:

```
? WithTax(10)
```

The Immediate window displays `10.65` because 10 times 1.065 equals 10.65. Figure 2-10 shows the function and the Immediate window.



Microsoft Visual Basic - Sample
File Edit View Insert Debug Run Tools Add-Ins Window Help
Sample - Module1 (Code)
(General)
WithTax
Immediate

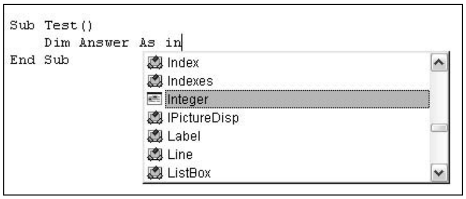
```
Option Compare Database


Public Function WithTax(AnyNumber As Currency) As Currency

    WithTax = AnyNumber * 1.065

End Function
```

```
? WithTax(10)
 10.65
```

Figure 2-10: Sample function tested in the Immediate window.

Typing and Editing in the Code Window

In order for a procedure to actually do anything, it has to contain some valid VBA code. As you type statements in the Code window, the VBA Editor offers a little help along the way. Figure 2-11 shows an example. As you type your line of code and get to a place where only certain words are allowed, a drop-down menu appears to let you know what those words are.



```
Sub Test()
    Dim Answer As in
End Sub
```

Figure 2-11: Drop-down menu of acceptable words.

As you continue to type, the drop-down menu moves down to the first item that matches what you've typed so far. Rather than type the whole word, you can type until the selected item in the drop-down menu matches what you intend to type, then press Enter. The word in the menu replaces what you've typed so far. This saves you some typing and also ensures that the word you typed is spelled correctly.

Shortcut keys used in the Code window

While typing in the Code window, you can use the various shortcut keys listed in Table 2-2 to navigate, make changes, and so forth. Most of the shortcut keys are identical to those found in other text-editing programs and word processors.

Table 2-2 Shortcut Keys You Can Use in the Code Window

Action	*Shortcut Key*
Move cursor right one character	→
Select character to right	Shift+→
Move cursor right one word	Ctrl+→
Select to end of word	Shift+Ctrl+→
Move cursor left one character	←
Select character to left of cursor	Shift+←
Move cursor left one word	Ctrl+←
Move cursor to start of line	Home
Select text to start of line	Shift+Home
Move cursor to end of line	End
Select text to end of line	Shift+End
Move cursor up a line	↑
Move cursor down a line	↓
Move cursor to next procedure	Ctrl+↓

(continued)

Table 2-2 *(continued)*

Action	*Shortcut Key*
Move cursor to previous procedure	Ctrl+↑
Scroll up one screen	PgUp
Scroll down one screen	PgDn
Go to top of module	Ctrl+Home
Select all text to top of module	Shift+Ctrl+Home
Go to bottom of module	Ctrl+End
Select all text to bottom of module	Shift+Ctrl+End
Cut selection	Ctrl+X
Copy selection	Ctrl+C
Paste	Ctrl+V
Cut current line to Clipboard	Ctrl+Y
Delete to end of word	Ctrl+Delete
Delete character or selected text	Delete (Del)
Delete character to left of cursor	Backspace
Delete to beginning of word	Ctrl+Backspace
Undo	Ctrl+Z
Indent line	Tab
Outdent line	Shift+Tab
Find	Ctrl+F
Replace	Ctrl+H
Find Next	F3
Find Previous	Shift+F3
View Object Browser	F2
View Immediate window	Ctrl+G
View Code window	F7
View shortcut menu	Shift+F10 (or right-click)
Get help with currently selected word	F1
Run a Sub/UserForm	F5
Stop code execution	Ctrl+Break

Typing comments

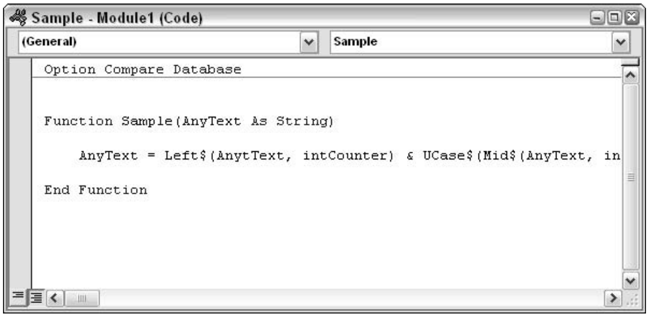
When typing VBA code, you can mix in programmer comments (usually called comments for short). A *comment* is plain-English text for human consumption only. VBA ignores all comments and processes only the code. As such, comments are entirely optional. The purpose of a comment is simply to “jot down notes” within the code, either as a future reminder to yourself or to other programmers working on the same project.

The first character of a comment must be an apostrophe (`'`). In the Code window, comments appear as green text. Each comment is on its own line or follows a line of VBA code. Never put VBA code to the right of a comment on the same line because VBA assumes all text after the apostrophe (on the same line) is just a comment and ignores everything to the right of the apostrophe.

Breaking lines of code

Unlike a word processor, where long lines of text are word-wrapped (broken between words as necessary), text in the Visual Basic Editor never wraps. You (and Access) really need to be able to see each line independently. If the Visual Basic Editor were to word-wrap, you wouldn’t really know exactly where one line ends and the next one begins.

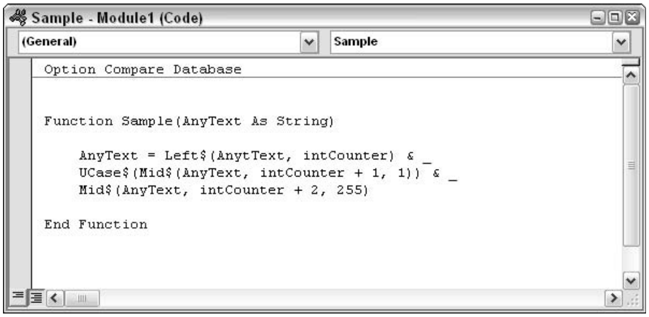
Sometimes you may end up typing a statement that extends beyond the right border of the window. For example, the line that begins with `AnyText =` in Figure 2-12 is actually much longer than it appears. Most of the line is invisible, cut off at the right margin. The statement works as is. Still, you may want to see the entire statement when writing, testing, or modifying your code.



```
Option Compare Database


Function Sample(AnyText As String)

    AnyText = Left$(AnytText, intCounter) & UCase$(Mid$(AnyText, in

End Function
```

Figure 2-12: Line starting with `AnyText=` is cut off in window.

If you want to break a single long statement into two or more lines, you must insert a *continuation character* (an underscore _) at the end of the line, just before you press Enter to break the line. Essentially, the continuation character tells Access, “The line break that follows isn’t the end of this statement. Rather, I want to break up this lengthy line.” Figure 2-13 shows the lengthy line broken into three shorter lines using the continuation character.



```
Option Compare Database


Function Sample(AnyText As String)

    AnyText = Left$(AnytText, intCounter) & _
    UCase$(Mid$(AnyText, intCounter + 1, 1)) & _
    Mid$(AnyText, intCounter + 2, 255)

End Function
```

Figure 2-13: Line starting with `AnyText=` broken into three lines.

Although you can break a statement into two or more lines using the continuation character, you cannot break a literal string in the same manner. A *literal string* is text enclosed in quotation marks, as in the following example:

```
SomeChunk = "A literal string is text in quotation marks"
```

If you try to break a literal string into two lines by using a continuation character, as the following example does, you get an error message:

```
SomeChunk = "A literal string is _
text in quotation marks"
```

To break a literal string, you need to terminate the top line with a quotation mark ("), followed by an ampersand (&), and then the continuation character (_). On the next line, enclose the entire second half of the literal text in quotation marks, as the following example shows:

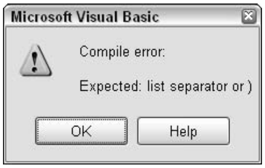
```
SomeChunk = "A literal string is " & _
"text in quotation marks"
```

Because breaking up lines is entirely optional, you may never have to concern yourself with these nitpicky details of breaking lines within literal text. However, when you cut and paste code written by others, you may find that the programmer has broken up lengthy lines to make them more readable. Just be aware that an underscore (_) at the end of a line means, “The line below is a continuation of this line, not a new and separate statement.”

Dealing with compile errors

Each statement in VBA code must be syntactically correct, complete, and must be either on its own line or correctly broken across several lines by using the continuation character. If you press Enter to end the line before you type a complete, syntactically correct statement, an error message appears on-screen.

For example, Figure 2-14 shows what you see if you type **MsgBox("Hello World"** and press Enter. The `MsgBox()` statement requires a closing parenthesis, missing in this example — so the editor displays an error message. In the Code window, the faulty line is shown in red.


Microsoft Visual Basic

Compile error:

Expected: list separator or)

Figure 2-14: Sample compile error.

The compile error means that the line you typed cannot be translated to instructions that Access can perform. Access can only compile and execute syntactically correct and complete statements. The part that says `Expected: list separator or )` tells you that Access expected to find either a comma (to separate the first argument from the second) or a closing parenthesis.

The box displaying the error message contains two buttons:

- ✦ **OK:** Closes the error message box so you can type in the correction
- ✦ **Help:** Provides some general information about the type of error discovered and provides some suggestions for fixing the problem

Regardless of which button you click, you need to correct the statement before it can work correctly. After you type the correct statement and press Enter, the error message no longer appears, and the line no longer displays in red.

Testing and Running Your Code

A completed procedure is generally called from some object, such as a button on a form. But as you write code, you may want to make sure it will work before you start attaching a procedure to objects in your database. You can use the Immediate window to run the procedure right on the spot. The syntax varies depending on whether you're testing a sub procedure or function as well as whether the procedure accepts arguments.

Testing sub procedures

To test a sub procedure that accepts no parameters, you simply type the name of the sub procedure into the Immediate window, and then press Enter.

The following procedure accepts no parameters and displays a message box when called:

```
Sub ShowThanks()
   MsgBox ("Thank you")
End Sub
```

To test the preceding procedure, simply type its name without the parentheses into the Immediate window, as the following:

```
ShowThanks
```

The procedure switches to the Access window and shows a message. Then close the message box and switch back to the Visual Basic Editor to continue writing code.

If a sub procedure accepts arguments, then you follow the procedure name by a blank space and the value to pass to the sub procedure. For example, the following sub procedure accepts one argument:

```
Sub WarnUser (msg as String)
   x=MsgBox(msg,vbCritical,"Warning")
End Sub
```

Access assumes that the passed parameter is a string. To test the procedure, you need to pass some text to it. Type the following into the Immediate window to test this procedure:

```
WarnUser "Don't move!"
```

When you press Enter, the procedure executes, displaying a message box in the Access window. Close the message box and return to the Visual Basic Editor.

If a procedure accepts more than one argument, separate the arguments by a comma. The following procedure accepts two string arguments:

```
Sub TakeTwo(msg as String, tBar As String)
   x = msgbox(msg,vbOKOnly,tBar)
End Sub
```

To test the procedure, you need to pass two parameters to it from the Immediate window, as in this example:

```
TakeTwo "Hello World", "Sample"
```

The result is a message box with "Hello World" on-screen, a single OK button, and "Sample" in the title bar. The result is the same if you execute this statement directly:

```
x = msgbox("Hello World",vbOKOnly,"Sample")
```

Running sub procedures from Access

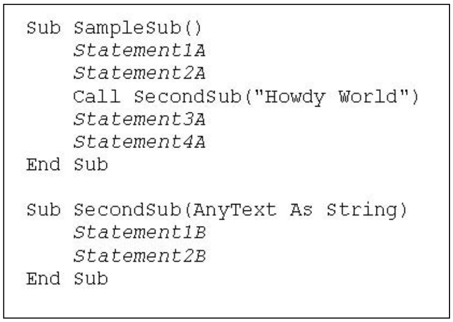
The real goal of a sub procedure, of course, is to run when appropriate from within Access. Sub procedures in a class module are usually tied to a control on the corresponding form or report. To actually run a procedure, open the corresponding form or report and trigger the event that causes the code to run. For example, if the code is attached to the On Click event of a button on a form, you need to open the form in Form view and click the button that runs the code.

Calling a procedure from another procedure

Any VBA procedure can call another procedure, using exactly the same syntax used to test the procedure in the Immediate window. If the sub procedure accepts no arguments, just call the procedure by name. If the sub procedure does contain arguments, include the passed values in the command.

You can use the Call keyword in front of the procedure name as a reminder that you're calling some other procedure, but the Call keyword is optional.

Figure 2-15 shows two sub procedures: one named SampleSub(), and the other named SecondSub() . The SampleSub() procedure includes a Call statement that calls upon SecondSub() to do its job. What happens when you execute SampleSub() is the following:



```
Sub SampleSub()
    Statement1A
    Statement2A
    Call SecondSub("Howdy World")
    Statement3A
    Statement4A
End Sub

Sub SecondSub(AnyText As String)
    Statement1B
    Statement2B
End Sub
```

Figure 2-15: One sub procedure calls another.

- *Statement1A* and *Statement2A* in SampleSub() are each executed.
- The Call SecondSub ("Howdy World") statement is executed, causing *Statement1B* and *Statement2B* in SecondSub() to be executed.
- The End Sub statement at the end of SecondSub() returns control to the next line in the calling procedure — *Statement3A*.
- Both *Statement3A* and *Statement4A* in SampleSub() are executed next.
- The End Sub statement at the end of the SampleSub() procedure is executed, and no more VBA code is executed.

Running sub procedures from macros

You can also call VBA sub procedures from macros, though technically, a macro only calls a function procedure, not a sub procedure. You have two choices if you still like to have a macro call a sub procedure:

- Convert the sub procedure to a function procedure.
- Write a function procedure that calls the sub procedure, and then call the function procedure from the macro.

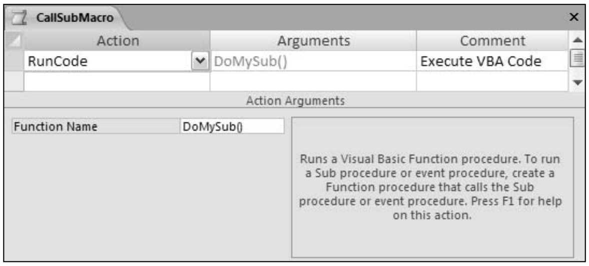
Converting a sub procedure to a function procedure is a simple matter of changing the Sub keyword at the top of the procedure to Function, and the End Sub statement at the bottom of the procedure to End Function.

If you want to leave the procedure as is and call it from a function, place the call to the sub procedure within a function procedure. When executed, the following DoMySub() function procedure calls the MySub() sub procedure.

```
 'The sub procedure below is named MySub()
Sub MySub()
   MsgBox ("MySub Ran")
End Sub

'Function procedure below calls MySub sub procedure.
Function DoMySub()
   Call MySub
End Function
```

To run MySub from a macro, you choose RunCode as the macro action. Then type the name of the function procedure — in this example, DoMySub() — as the Action Argument for the RunCode action, as shown in Figure 2-16.

For a reminder on defining macro actions, see Book VI, Chapter 1.



CallSubMacro

Action	Arguments	Comment
RunCode	DoMySub()	Execute VBA Code

Action Arguments

Function Name	DoMySub()

Runs a Visual Basic Function procedure. To run a Sub procedure or event procedure, create a Function procedure that calls the Sub procedure or event procedure. Press F1 for help on this action.

Figure 2-16: Run a sub procedure from a macro.

Testing function procedures

Unlike sub procedures, which return no value, a function procedure always returns a value. To test a function from the Immediate window, use the *?* (“What is . . . ?”) symbol, followed by the function name — and, if necessary, use the values that pass to the function.

For example, the following custom function accepts no arguments. When called, the day of the week is returned:

```
Function Today() As String
   Today = WeekDayName(Weekday(Date))
End Function
```

To test the function, type the following into the Immediate window and press Enter:

```
? Today()
```

The Immediate window then displays the value returned by the function. If you ran the test on a Monday, the function would return

```
Monday
```

The following function procedure accepts a single number as an argument (and returns a number).

```
Function Area(radius As Double) As Double
   Area = 3.141592654 * (radius ^ 2)
End Function
```

To test the function, call it with the ? symbol and pass some number to it, as in this example:

```
? Area(10)
```

The Immediate window then displays the value returned by the function, as the following shows:

```
314.1592654
```

If the function accepts multiple arguments, you just separate the arguments with commas, as when using the Access built-in functions.

Using function procedures in Access

When you create a function procedure in VBA, you can use that function any place within the database where you use a built-in function. Wherever you use an expression in Access, that expression can contain built-in functions, custom function procedures, or both. Here are some examples:

- In an expression used in the `Control Source` property of a calculated control on a form or a report
- In an expression that defines a calculated field in a select query
- In an expression in the Update To row of an update query
- In an expression used in a macro
- As a custom action called from a macro, such as the example shown back in Figure 2-16

In Access, function procedures are generally easier to use than sub procedures. Calling a function procedure from within any expression is easy. Most pre-written custom VBA code you may find on the Web is organized into function procedures rather than sub procedures.

Chapter 3: Writing Smarter Code

In This Chapter

- **Using variables and constants to store temporary data**
- **Having your code make decisions**
- **Executing the same code repeatedly**
- **Managing data with custom VBA functions**

As with all programming languages, VBA offers certain concepts and statements designed to allow you to write the code necessary to make a computer do — well, *anything*. Those concepts and statements are the subject of this chapter.

We must point out, though, that the underlying VBA concepts described in this chapter aren't unique to VBA. Virtually all programming languages are built around these same concepts. If you ever have aspirations of learning to program in any language — be it Java, JavaScript, C++, C#, VBScript, or whatever — the concepts you discover in this chapter apply equally to most programming languages.

Creating Variables and Constants

Within a procedure, you define and use *variables*. A variable is a name — a placeholder — for any data that may change. You make up your own variable names — choose names that indicate what information the variable contains, so you don't have to wonder later. Variable names must begin with a letter, cannot contain spaces or punctuation, and cannot be the same as any built-in keyword.

Unlike data stored in a table, data stored in a variable is not permanent. Data stored in a variable is fleeting and exists only for as long as VBA needs the information contained within the variable.

Make me a variable

You can create variables in a couple of ways in VBA code. The quick-and-dirty way is to simply make up a variable name and assign a value by following the name with an equal sign (=) and the value to be stored in the variable.

The following VBA statements define three variables named x, y, and ExtPrice. The variable x stores the number 10, the variable y stores the number 9.99, and the variable ExtPrice stores the result of multiplying the contents of x by the contents of y (or 99.9 by the time all three lines are executed):

```
x = 10
y = 9.99
ExtPrice = x * y
```

These statements are all examples of *implicit variable declarations.*

Explicit variable declaration, as the name implies, requires that you assign a data type to each variable before you assign the variable a value. Explicit variable declaration is a little more work, but your code runs more smoothly and efficiently because Access doesn't have to figure out the best data type to use when it encounters the data lurking in the variable.

Two steps go into using a variable explicitly. First you *define* (or *declare*) the variable, which gives the variable a data type. After the variable exists, you assign a value using the same syntax as for implicit declarations: *variableName = value*.

The command for defining a variable explicitly is Dim, short for *dimension.* But thinking of Dim as standing for "Define In Memory" may be easier because variables exist only in the computer's random access memory (RAM). The simplified syntax for the Dim statement looks like this:

```
Dim varname [As type] [,...]
```

where *varname* is a name of your own choosing. The *type* refers to one of the acceptable VBA data types or object types. The data types you assign to variables in a Dim statement are the same as those used in defining arguments in a Function or Sub statement.

The comma and ellipsis in the syntax chart mean that you can define multiple variables, separated by commas, within a single statement. For example, the following statement declares one variable, named ReportName, as a string (textual data):

```
Dim ReportName as String
```

The following sample Dim statement declares two variables: a string named ReportName and a long integer named Qty. The lines after the Dim statement then assign a value to each variable using the standard `variableName = value` syntax:

```
Dim ReportName as String, Qty as Long
ReportName = "Sales Summary Report"
Qty = 50
```

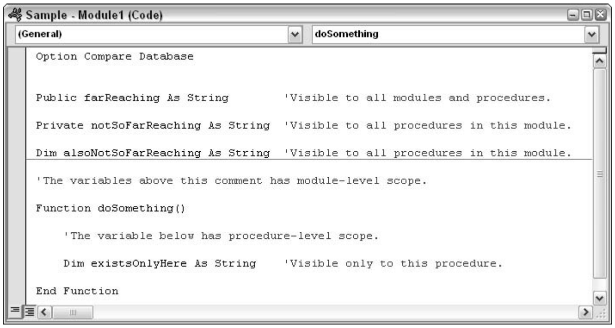
Scope and lifetime of variables

All variables and constants have a scope and a lifetime. The *scope* of a variable defines to which procedures the variable is visible. You determine the scope of a variable when you declare the variable. Variables declared at the beginning of a module (before the first procedure in the module) can be either *private* (visible only to procedures within the same module) or *public* (visible to all procedures in all modules). These variables have *module-level scope.*

If you use the `Public` keyword (rather than `Dim`) to declare a variable at the module level, the variable is visible to all procedures in all modules. On the other hand, if you use a `Dim` or `Private` statement to define a variable at the module level, the variable is private to the module. All procedures defined within the same module can see the variable, but the variable is invisible to procedures defined in other modules.

When you define a variable within a procedure, that variable has *procedure-level scope,* meaning that the variable is *private* (visible only) to the procedure in which it is defined. Only the procedure in which the variable is defined can see, and use, the variable.

Figure 3-1 shows a module with several variables declared using `Dim`, `Private`, and `Public` keywords. Comments in the code describe the scope of the variables declared within the module as follows:



```
Option Compare Database


Public farReaching As String        'Visible to all modules and procedures.

Private notSoFarReaching As String  'Visible to all procedures in this module.

Dim alsoNotSoFarReaching As String  'Visible to all procedures in this module.

'The variables above this comment has module-level scope.

Function doSomething()

    'The variable below has procedure-level scope.

    Dim existsOnlyHere As String    'Visible only to this procedure.

End Function
```

Figure 3-1: Scopes of sample variables.

- **`Public farReaching As String`:** The variable named `farReaching` is visible to all procedures in all modules because it's declared by using the `Public` keyword.
- **`Private notSoFarReaching As String` and `Dim alsoNotSoFarReaching As String`:** These variables are visible to all procedures in the same module but are not visible to procedures defined in other modules. `Dim` and `Private` have the same meaning in this context.
- **`Dim existsOnlyHere As String`:** Because this variable is declared within a procedure, the variable is visible only to that procedure.

The *lifetime* of a variable defines how long a variable retains a value. When you open a database, variables defined at the module level of standard modules are created and can be assigned a new value at any time. The lifetime of such variables is lengthy — these variables exist and can contain values for the entire session — from the time you open the database to the time you close it.

Variables declared with a `Dim` keyword at the procedure level have a much shorter lifetime. The variable retains its value only for as long as the procedure runs. A second call to the same procedure re-creates the variables and assigns new values to them.

Though it's rare to do so, you may want to make one or more variables retain their values between calls to the procedure in some instances. For example, you may have a variable that keeps track of how many times the procedure is called. In that case, you can use the `Static` keyword, rather than `Dim`, to declare the variable or variables. The following statement defines a static variable named `howMany`, which stores an integer (whole number).

```
Static howMany as Integer
```

You can make all variables declared within a procedure static by preceding the `Sub` or `Function` keyword with `Static`. All variables defined within the following procedure are static because the `Static` keyword in front of the word `Function` makes all that procedure's variables static:

```
Static Function myFunction()
   'Both variables below are static
   Dim var1 As String
   Dim var2 As Byte
End Function
```

If you find this terribly confusing, you rarely need to be so picky about the scope and lifetimes of variables. In fact, if you never use the `Public`, `Private`, or `Static` keywords in any code you write, chances are the code will still work perfectly — the default scope and lifetime assigned to a variable through the `Dim` statement is usually exactly what you need. Exceptions are few and far between, and are not likely to show up until you start developing huge and complex databases.

Defining constants

A *constant* is similar to a variable: It has a name, a data type, and a value. However, unlike a variable (whose contents can change at any time), a constant's value never changes. Constants are often used to assign a short name to some value that must be used repeatedly throughout the code, but never changed.

To declare a constant, you use the `Const` keyword. The simplified syntax for the `Const` keyword is

```
Const name [As type]=value [, name [As type]=value]...
```

You define the name, data type (*`type`*), and value of the constant on a single line. The rules for coming up with a name are the same as those for a variable: It must start with a letter, cannot contain blank spaces or punctuation, and cannot be the same as a VBA keyword.

As an example of creating a constant, the following statement defines a constant named `pi` as a double-precision number containing the value `3.141592654`:

```
Const pi As Double = 3.141592654
```

You can declare multiple constants in a single `Const` statement by separating them with a comma. For example, the following statement declares two constants, a number named `x` of the Byte data type with a value of `10`, and a string named `myName` containing the text `"Alan"`:

```
Const x As Byte = 10, myName As String = "Alan"
```

Constants tend to be private to the module in which they're defined. If you want to ensure that a constant is available to all objects and all modules within the database, precede `Const` with the `Public` keyword, as the following shows:

```
Public Const pi As Double = 3.141592654
```

Organizing variables into arrays

An *array* is a collection of variables organized into a list or table. Each item's name is the same, but each has one or more *subscripts* that uniquely identify each item in the array based on its position in the array. The subscript is one or more numbers, enclosed in parentheses, that follow the name. If `Colors` is the name of an array, `Colors(1)` (pronounced *colors sub 1*), is the first item in the list, `Colors(2)` is the second item in the list, and so forth.

In a sense, an array is like a database table, in that the data can be organized into rows and columns. And you can use VBA to manipulate data stored in tables. The only time you really want to use an array is when you work with a small amount of data that either never changes or changes only while the code is running. The data in an array is defined in code, not in a table, so getting to the data stored in the array is not easy.

The syntax for declaring an array is almost identical to that of creating a variable. However, you need to define the number of *dimensions* in the array and the number of *elements* in each dimension of the array. An array can have up to 60 dimensions and virtually any number of elements within each dimension. The basic syntax for declaring an array using the `Dim` statement is

```
Dim varname[([subscripts])] [As type] [,varname[([subscripts])] [As type]] . .
```

In this statement

- *`varname`* is the name assigned each element in the array.
- *`subscripts`* is the number of elements in each dimension, with each dimension separated by a comma. It can contain the optional keyword `To` to specify the starting and ending subscripts.
- *`type`* is any valid VBA data type.

All arrays are zero-based unless you specify otherwise, which means that the first item in the array has a subscript of zero, rather than one. The number of elements specified is actually one less than the total number of elements that the array contains.

For example, the following `Dim` statement declares a one-dimensional array named `Colors` that contains four string elements (numbered 0, 1, 2, and 3):

```
Dim Colors(3) as String
```

The following lines of code show how you can then assign a value to each element in the array. Because the first item always has a subscript of zero, you actually place four, rather than three, items into the array:

```
Colors(0)="black"
Colors(1)="red"
Colors(2)="blue"
Colors(3)="green"
```

Having the first element in an array start with a zero can be counterintuitive for us humans, who tend to think of the first item in a list as being number 1. You can force the first element to be 1 by specifying a range (rather than a number) of elements in the `Dim` statement. The following `Dim` statement declares an array of three elements, with subscripts ranging from 1 to 3. The lines after the `Dim` statement assign a value to each of those elements:

```
Dim Colors(1 To 3) as String
Colors(1)="red"
Colors(2)="blue"
Colors(3)="green"
```

Another alternative, if you want all your arrays to start at 1 rather than 0, is to simply put the following statement up in the `Declarations` section of the module, before the first procedure in the module:

```
Option Base 1
```

After you add the `Option Base 1` statement to the top of a module, all arrays within that module start at 1 rather than zero. Thus the `Dim Colors(3)` statement creates an array of three elements, numbered 1, 2, 3, as you expect. There is no `Colors(0)` when the optional base for arrays is set to 1 via the `Option Base 1` module declaration.

Multidimensional arrays

A *multidimensional array* is one that offers more than one subscript per name. The simplest example is a two-dimensional array, which you can envision as a table. The first subscript in a two-dimensional array represents the element's row position in the array. The second subscript represents the element's column position in the array. For example, in the following array, `State(3,2)` refers to "row 3, column 2" in the `States` array, which contains `"AZ"`.

```
State(1,1)="Alabama"          State(1,2)="AL"

State(2,1)="Alaska"           State(2,2)="AK"

State(3,1)="Arizona"          State(3,2)="AZ"

State(50,1)="Wyoming"         State(50,2)="WY"
```

The Dim statement that creates a two-dimensional array named States, with 50 row elements and 2 column elements, is shown with the following statement. If you use the Option Base 1 statement in the Declarations section, the starting number for each array is 1:

```
Dim States (50,2) as String
```

The code to *populate* the array (that is, to assign a value to each variable) looks like this:

```
State(1,1)="Alabama"
State(1,2)="AL"
State(2,1)="Alaska"
State(2,2)="AK"
State(3,1)="Arizona"
State(3,2)="AZ"
...
State(50,1)="Wyoming"
State(50,2)="WY"
```

Although all programming languages support multidimensional arrays, you won't use them in Access very often. Instead, you can use a table to store lists and tables of data, and then use Access code to extract data, as needed, from that table.

Naming conventions for variables

Some programmers use *naming conventions* to identify the data type of a variable as part of the variable's or constant's name. The naming conventions are entirely optional — you don't have to use them. But a lot of VBA programmers follow them, so you're likely to see them in any code you happen to come across.

The idea behind a naming convention is simple. When you define a new variable, make the first three letters of the name (referred to as the tag) stand for the type of variable or object. The following line creates an Integer variable named intMyVar, where int is short for *integer*.

```
Dim intMyVar As Integer
```

The tag added to the front of the name doesn't affect how the variable is stored or how you can use it. The tag serves only as a reminder that MyVar is an Integer. Table 3-1 summarizes the tags you'll most likely encounter when reading other people's code. In the Sample Declaration column of the table, the italicized word *Name* means that you can put in any variable name of your own choosing.

Table 3-1 Naming Conventions Used Among VBA Programmers

Tag	*Stands For*	*Sample Declaration*
`byt`	`Byte` data type	`Dim bytName As Byte`
`cur`	`Currency` data type	`Dim curName As Currency`
`dtm`	`Date/Time` data type	`Dim dtmName As Date`
`dbl`	`Double` data type	`Dim dblName As Double`
`int`	`Integer` data type	`Dim intName As Integer`
`lng`	`Long integer` data type	`Dim lngName As Long`
`sng`	`Single` data type	`Dim sngName As Single`
`bln`	`Boolean` data type	`Dim blnName As Boolean`
`str`	`String` data type	`Dim strName As String`
`var`	`Variant` data type	`Dim varName As Variant`

Making Decisions in VBA Code

Decision-making is a big part of programming — most programs need to be smart enough to figure out what to do depending on circumstances. Often, you want your code to do one thing "if such-and-such is true," and do something else "if such-and-such is false." You use conditional expressions to determine if something is true or false. A *conditional expression* is one that generally follows the syntax

```
Value ComparisonOperator Value
```

where `Value` is some chunk of information and the `ComparisonOperator` is one of those listed in Table 3-2.

Table 3-2 Comparison Operators

Operator	*Meaning*
=	Equal to
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to
<>	Not equal to

For example, the expression

```
[Last Name] = "Smith"
```

compares the contents of the `Last Name` field to the string “Smith”. If the `[Last Name]` field does, indeed, contain the name `Smith`, the expression is (or *returns*) `True`. If the `[Last Name]` field contains anything other than `Smith`, the expression returns `False`.

Another example is the following statement:

```
[Qty] >= 10
```

The content of the `Qty` field is compared to the number 10. If the number stored in the `Qty` field is 10 or greater, the expression returns `True`. If the number stored in the `Qty` field is less than 10, the expression returns `False`.

You can combine multiple conditional expressions into one using the logical operators summarized in Table 3-3.

Table 3-3 Logical Operators

Operator	*Meaning*
`and`	Both are true
`or`	One or both are true
`not`	Is not true
`xor`	Exclusive or: One — but not both — is true

The following conditional expression requires that the `[Last Name]` field contain `"Smith"` and the `[First Name]` field contain `"Janet"` in order for the entire expression to be `True`:

```
[Last Name]="Smith" and [First Name]="Janet"
```

An example of an expression that returns `True` if the `State` field contains either `NJ` or `NY` is the following:

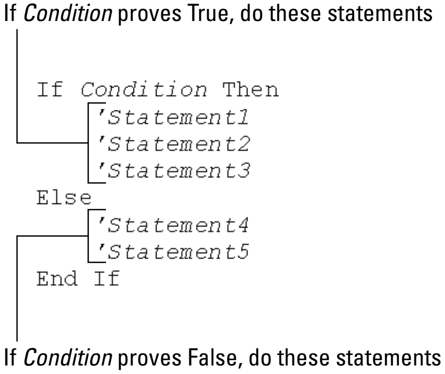
```
[State]="NJ" or [State]="NY"
```

Using If...End If statements

You can have VBA code make decisions as the code is running in several ways. One method is to use the `If...End If` block of code. The syntax for `If...End If` looks like this:

```
If condition Then
   [statements]...
[Else
   [statements]...
End If
```

where *condition* is an expression that results in `True` or `False`, and *statements* refers to any number of valid VBA statements. If the condition proves `True`, the statements between `Then` and `Else` execute, and all other statements are ignored. If the condition proves `False`, only the statements after the `Else` statement execute, as illustrated in Figure 3-2.


If *Condition* proves True, do these statements
If *Condition* proves False, do these statements

```
If Condition Then
     'Statement1
     'Statement2
     'Statement3
Else
     'Statement4
     'Statement5
End If
```

Figure 3-2: Basic idea behind `If...End If`.

As an example, imagine that a `State` variable contains some text. The following `If...End If` block checks to see whether the `State` variable contains `NY`. If the `State` variable does contain `NY`, the `TaxRate` variable receives a value of `0.075 (7.5%)`. If the `State` variable does not contain `NY`, the `TaxRate` variable receives a value of `0`.

```
If State="NY" Then
   TaxRate=0.075
Else
   TaxRate=0
End If
```

You have a little bit of flexibility when using `If...End If`. If only one line of code executes for a `True` result and only one line executes for a `False` result, you can put the whole statement on a single line and omit the `End If` statement, as the following shows:

```
If State="NY" Then TaxRate=0.075 Else TaxRate=0
```

Because you can use any built-in function in VBA, and Access supports the use of the iif() (*immediate if*) function, you can also write the preceding statement as an expression:

```
TaxRate = iif([State]="NY",0.075,0)
```

In the block format, you can also write code that tests for more than just two possible conditions, using the optional ElseIf statement. Suppose the Reply variable stores a string of text. If Reply contains the word "Yes", your code does one thing. If Reply contains "No", your code does something else. If Reply contains neither "Yes" nor "No", then you want your code to do something else instead. You could set up an If...End If block to test for and respond to all three conditions, as the following:

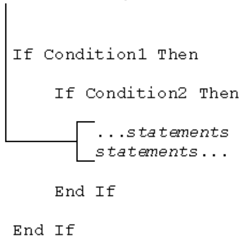
```
If Reply = "Yes" Then
   statements for "Yes" reply
ElseIf Reply="No" Then
   statements for "No" reply
Else
   statements for any other reply
End If
```

When the code has to make a decision from many possibilities, you may find using a Select Case...End Select block is easier, described in the section, "Using a Select Case block," later in this chapter.

Nesting If...End If statements

What if you have more than two possible scenarios? No problem — you can nest If...End If blocks, meaning you can put one complete If...End If block inside another If...End If block. For example, in the code shown in Figure 3-3, the innermost statements execute only if Condition1 and Condition2 result in True.

Executed only if *Condition1* and *Condition2* both true



```
If Condition1 Then

    If Condition2 Then

       ...statements
       statements...

    End If

End If
```

Figure 3-3: Nested If...End If blocks.

You can see why the nested `If...End If` statements work if you look at what happens when either test proves `False`. For example:

- If *`condition1`* proves `False`, all code down to the last `End If` statement is skipped over. The inner `If...End If` block isn't seen or executed.
- If *`condition1`* proves `True`, but *`condition2`* proves `False`, all the statements in the nested block are ignored. The innermost statements still don't execute.
- If both *`condition1`* and *`condition2`* prove `True`, no code is skipped over and the innermost statements execute normally.

You can nest `If...Else...End If` blocks as deeply as you want. However, you have to make sure each one has its own `End If` statement.

Using a Select Case block

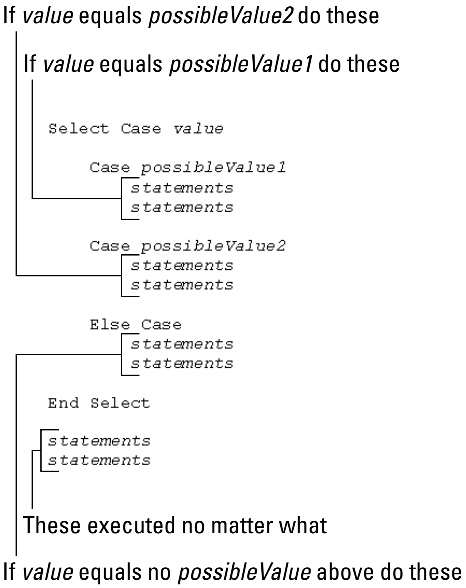
But what if you have more than two or three cases to check for? For example, what if you need to perform different statements depending on which of ten product types a person ordered? You could nest a lot of `If...End If` blocks, but it would be confusing. Luckily, Access provides a better way.

A `Select Case` block of code is one that performs a particular set of instructions depending on some value. Typically, the value is stored in a variable or field in a table, and is a number that represents some previously made selection. The basic syntax of a `Select Case` block of code looks like this:

```
Select Case value
   [Case possibleValue  [To possibleValue]
      [statements]]
   [Case possibleValue [To possibleValue]
      [statements]]...
   [Case Else
      [statements]]
End Select
```

where *`value`* is some value, like a number, and *`possibleValue`* is any value that could match the value. You can have any number of `Case` *`possibleValue`* statements between the `Select Case` and `End Select` statements. Optionally, you can include a `Case Else` statement, which specifies statements that execute only if none of the preceding `Case` *`possibleValue`* statements prove `True`.

Each `Case` statement can have any number of statements beneath it. When the code executes, only those statements after the `Case` statement that match the *`value`* at the top of the block execute. Figure 3-4 shows the idea.



If *value* equals *possibleValue2* do these

If *value* equals *possibleValue1* do these

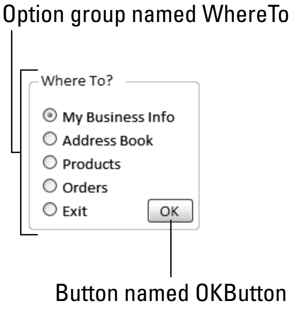
```
Select Case value

    Case possibleValue1
        statements
        statements

    Case possibleValue2
        statements
        statements

    Else Case
        statements
        statements

End Select

statements
statements
```

These executed no matter what

If *value* equals no *possibleValue* above do these

Figure 3-4: A `Select Case...End Select` block.

As an example, suppose you create a custom option group named `WhereTo` and a command button named `OKButton` on a form like the one in Figure 3-5. When the user chooses an option and clicks OK, you want to have the appropriate form open.



Option group named WhereTo

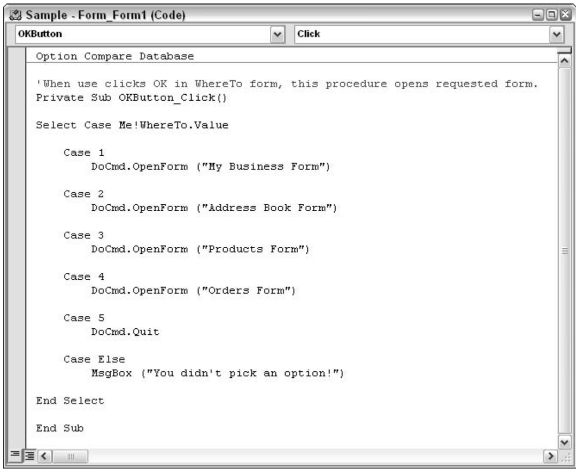
Where To?

● My Business Info
○ Address Book
○ Products
○ Orders
○ Exit

Button named OKButton

Figure 3-5: Option group and button on a form.

In the class module for that form, a sub procedure named `OKButton_Click()` executes whenever someone clicks OK. The sub procedure, as shown in Figure 3-6, opens a form, exits Access, or does nothing, depending on what's selected in the `WhereTo` option group.



```
Option Compare Database

'When use clicks OK in WhereTo form, this procedure opens requested form.
Private Sub OKButton_Click()

Select Case Me!WhereTo.Value

    Case 1
        DoCmd.OpenForm ("My Business Form")

    Case 2
        DoCmd.OpenForm ("Address Book Form")

    Case 3
        DoCmd.OpenForm ("Products Form")

    Case 4
        DoCmd.OpenForm ("Orders Form")

    Case 5
        DoCmd.Quit

    Case Else
        MsgBox ("You didn't pick an option!")

End Select

End Sub
```

Figure 3-6: Sub procedure to handle `OKButton_click()`.

The `OKButton_Click()` procedure does its job this way: When called, the following statement executes first:

```
Select Case Me!WhereTo.Value
```

This statement uses the `Me!WhereTo.Value` expression to refer to the value of the `WhereTo` option group on the form. The word `Me!` is used mainly in class modules to refer to the form or report to which the class module is attached. `Me!WhereTo.Value` is a number between 1 and 5 when the code executes. If no option is selected, `Me!WhereTo.Value` equals `Null`. In that case, the code after the `Case Else` statement executes.

If you omit the `Case Else` statement from the sample code, no code within the `Select Case...End Case` block executes when `Me!WhereTo.Value` contains something other than a number from 1 to 5. Execution still continues normally, however, at the first line after the `End Case` statement.

The optional `To` keyword of the `Case` statement can be used to specify a range of values to compare against. In the following code, statements after `Case 1 To 9` execute only if `SomeNumber` contains a value from 1 to 9. Statements after `Case 10 To 99` execute only if `SomeNumber` contains a value from 100 to 999, and so forth.

```
Select Case SomeNumber
   Case 1 to 9
      Statements for when SomeNumber is between 1 and 9
   Case 10 to 99
      Statements for when SomeNumber is between 10 and 99
   Case 100 to 999
      Statements for when SomeNumber is between 100 and 999
End Select
```

Executing the Same Code Repeatedly

Occasionally, a situation occurs where you want to execute one or more VBA statements multiple times. Say you write some VBA statements that need to operate on each record in a table, and there are 1,000 records in the table. You have two choices: Write each set of statements 1,000 times, or create a loop that repeats the one set of statements 1,000 times. Needless to say, typing the statements once rather than 1,000 times saves you a lot of time. A loop is your best bet.

Using Do...Loop to create a loop

The `Do...Loop` block is one method of setting up a loop in code to execute statements repeatedly. Two syntaxes for using `Do...Loop` exist. The first syntax evaluates the condition of the loop, as the following shows:

```
Do [{While | Until} condition]
   [statements]
   [Exit Do]
   [statements]
Loop
```

The second syntax provides the option of defining the condition at the bottom of the loop, using this syntax:

```
Do
   [statements]
   [Exit Do]
   [statements]
Loop [{While | Until} condition]
```

As an example of the first syntax, the code in the following `Do Until` loop executes once for each record in a recordset named `rst`. (A recordset, as discussed in Chapter 4 of this minibook, is the VBA equivalent of a table in Access.)

```
'Example assumes recordset named rst already exists.
rst.MoveFirst
Do Until rst.EOF()
   Debug.Print rst.Fields("Product Name")
   rst.MoveNext
Loop
```

How the loop works is as follows: The rst.MoveFirst statement moves the cursor to the first record in the table. At that point, EOF() (which stands for End Of File) is False because EOF() means "past the last record in the table." Because the cursor is at the first record, EOF() is False.

Within the loop, the rst.MoveNext statement moves the cursor to the next record in the table. But EOF() remains False until rst.MoveNext executes a sufficient number of times to have visited every record in the table. After visiting the last record, rst.MoveNext moves the cursor to the end of the file — past the last record. When the cursor is past the last record, EOF() becomes True, and the loop doesn't repeat anymore. Instead, Access resumes executing your code normally at the first statement after the Loop statement.

Using the alternative syntax, where you define the condition at the bottom, rather than at the top of the loop, you can construct that same sort of loop as follows:

```
'Example assumes recordset named rst already exists.
rst.MoveFirst
Do
   Debug.Print rst.Fields("Product Name")
   rst.MoveNext
Loop Until rst.EOF()
```

You'll notice one subtle difference between setting the loop condition at the top of the loop rather than at the bottom of the loop. Access checks the condition *before* the loop executes for the first time (and each time thereafter). When you set the condition at the top of the loop, none of the statements in the loop may execute. Forgetting about recordsets and tables for the moment, consider the following more generic example:

```
Counter = 101
Do While Counter < 100
   Counter = Counter +1
Loop
'Statements below the loop.
```

Because Counter already has a value of 101 when the Do While Counter < 100 statement executes, the looping condition is False right off the bat. Thus, everything between the Do While and Loop statements is skipped over completely, and code execution resumes at the statements after the loop.

In the following code, we move the looping condition, While Counter < 100, to the bottom of the loop:

```
Counter = 101
Do
   Counter = Counter +1
Loop While Counter < 100
'Statements below the loop.
```

In the preceding loop, Counter receives a value of 101. The Do statement doesn't specify a condition for starting the loop, so the Counter = Counter + 1 statement within the loop executes. The Loop While Counter < 100 condition then proves False (because Counter = 102 by then), so code execution continues at the statements after the Loop statement at the bottom of the loop.

In short, when you define the condition for the loop at the top of the loop, the code within the loop may not execute at all. But if you define the condition at the bottom of the loop, the code within the loop executes at least once.

Using While...Wend to create a loop

The While...Wend loop is similar to Do...Loop, but it uses the simpler (and less flexible) syntax shown in the following code:

```
While condition
   [statements]
Wend
```

where *condition* is an expression that results in a True or False value, and *statements* are any number of VBA statements, all of which execute with each pass through the loop.

The condition is evaluated at the top of the loop. If the condition proves True, all lines within the loop execute (down to the Wend statement) and then the condition at the top of the loop is evaluated again. If the condition proves False, all statements within the loop are ignored, and processing continues at the first line after the Wend statement.

Using For...Next to create a loop

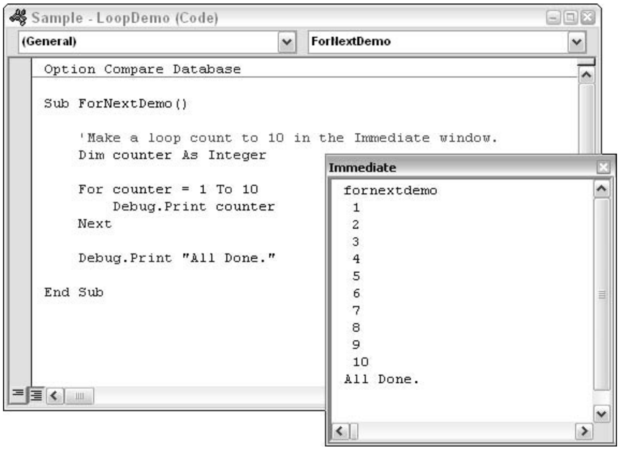
When you want to create a loop that keeps track of how many times the loop repeats, you can use the For...Next block of statements. The syntax for a For...Next loop is as follows:

```
For counter = start To end [Step step]
   [statements]
   [Exit For]
   [statements]
Next [counter]
```

where

- *counter* is any name you want to give to the variable that keeps track of passes through the loop.
- *start* is a number that indicates where the loop should start counting.
- *end* is a number that indicates when the loop should end.
- *step* is optional and indicates how much to increment or decrement *counter* with each pass through the loop. If omitted, *counter* increments by 1 with each pass through the loop.
- *statements* are any number of VBA statements that execute with each pass through the loop.

Figure 3-7 shows a simple example of a For...Next loop within a sub procedure. This loop starts at 1 and increments the Counter variable by 1 with each pass through the loop. The loop continues until Counter reaches a value of 10, at which point the loop is done and processing continues at the first line after the Next statement. Within the loop, the Debug.Print statement simply prints the current value of the Counter variable to the Immediate window.



```
Option Compare Database

Sub ForNextDemo()

    'Make a loop count to 10 in the Immediate window.
    Dim counter As Integer

    For counter = 1 To 10
        Debug.Print counter
    Next

    Debug.Print "All Done."

End Sub
```

```
fornextdemo
 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
All Done.
```

Figure 3-7: A simple For... Next loop in a sub procedure.

The results of testing the procedure in the Immediate window are shown in Figure 3-7. As you can see, the Counter value displays once with each pass through the loop. Then processing continues at the lines that use Debug.Print to display a blank line and the words "All done".

Book VIII Chapter 3

Writing Smarter Code

Note that if you change the loop so that it counts from 2 to 10 and adds 2 (rather than 1) to Counter with each pass through the loop, the code looks like the following:

```
For counter = 2 to 10 Step 2
   Debug.Print counter
Next
```

Running the preceding loop displays the following in the Immediate window:

```
2
4
6
8
10
All done
```

Looping through an array

You can use the Counter variable for a For...Next loop as the subscript for elements in an array. You can use the LBound() (lower boundary) and UBound() (upper boundary) functions to automatically return the lowest and highest subscripts in the array. You can use those values as the *start* and *end* values in the For... statement. The following code creates an array of four elements and assigns a value — a color name — to each element in the array. The For...Next loop that follows the array prints the contents of each array element by using the Counter value as the subscript for each pass through the loop:

```
Sub LoopArrayDemo()
    'Declare and variable and an array.
    Dim counter As Integer
    Dim Colors(3) As String

    'Fill the array.
    Colors(0) = "Black"
    Colors(1) = "Red"
    Colors(2) = "Green"
    Colors(3) = "Blue"

    'Create a loop that shows array contents.
    For counter = LBound(Colors) To UBound(Colors)
        Debug.Print Colors(counter)
    Next

End Sub
```

In the `For` statement, `LBound(Colors)` and `UBound(Colors)` automatically fill in the lowest and highest subscript numbers. On the first pass through the loop, the `Debug.Print` statement prints the contents of `Colors(0)`. On the second pass through the loop, `Debug.Print` displays the contents of `Colors(1)`, and so forth, until all array elements print.

Analyzing each character in a string

You can also use a `For...Next` loop to look at each character in a string. First, be aware that these two built-in Access functions help with the loop:

- `Len(`*`string`*`)`: Returns the length of a string in number of characters
- `Mid(`*`string`*`,`*`start`*`,`*`length`*`)`: Returns a portion of *`string`* starting at character *`start`* that's *`length`* characters long

As an example, if *`string`* is `"Hello World"`, `Len(`*`string`*`)` returns `11` because there are 11 characters in `"Hello World"` (counting the blank space that separates the two words). The expression `Mid(string,7,3)` returns a substring of *`string`* that starts at the seventh character and is three characters in length. In this case, that would be `Wor` (because W is the seventh character, and the returned substring is three characters in length).

Text-handling functions are described in more detail in Book III, Chapter 3.

To create a loop that looks at each character in a string, one at a time, start the loop at `1` and end it at `Len(string)`. Within the loop, use `Mid(string,counter,1)` to isolate the single character at the position indicated by `Counter`. A simple loop that just prints each character from the string names `strFull` in the Immediate window looks like this:

```
Sub LookAtEachCharacter()
'Declare a couple of string variables.
Dim strFull As String, thisChar As String
'Give strFull a value.
strFull = "Hello World"
'Now isolate and display each character from strFull.
For Counter = 1 to Len(StrFull)
   thisChar = Mid(strFull,Counter,1)
   Debug.Print thisChar
Next
End Sub
```

The `For Each...Next` loop is a slight variation on the `For...Next` loop, and is discussed in Chapter 4 of this minibook.

Using Custom Functions

Access has many built-in functions that you can use in expressions. One of the beauties of VBA is that you can create your own custom functions. They're commonly referred to as *user-defined functions* or *UDFs*. After you've created such a function in a standard module, you can use it throughout your database as you would a built-in function.

To illustrate, we'll show you a function that converts numbers like `123.45` to words like `One Hundred Twenty Three and 45/100`. It's handy for printing checks. This function also requires using a little bit of everything that VBA has to offer — variables, arrays, loops, and decision-making. So it works as an example of how programmers combine all aspects of programming languages to come up with solutions to problems. Comments throughout the function explain what's going on, but it's not important to understand everything about how it works. Rather, it's just an example of what a large custom function might look like.

To create a custom function that's accessible to all objects in a database, you have to put the function in a standard module. The listing below shows the `NumWord()` custom function used to convert numbers to words as it would appear in a module under the words `Option Compare Database` in the module:

```
'Declare variables for NumWord to use
Dim English As String, strNum As String
Dim Chunk As String, Pennies As String
Dim Hundreds As Integer, Tens As Integer
Dim Ones As Integer, LoopCount As Integer
Dim StartVal As Integer, TensDone As Boolean
Dim EngNum(90) As String

'NumWord converts a number to its words,
'Useful for printing checks.
Function NumWord(AmountPassed As Currency) As String

    'Just bail out if no valid check amount passed.
    If AmountPassed <= 0 Then
        NumWord = "Void"
        Exit Function
    End If

    'Set up the array of words for numbers.
    EngNum(0) = ""
    EngNum(1) = "One"
    EngNum(2) = "Two"
    EngNum(3) = "Three"
    EngNum(4) = "Four"
    EngNum(5) = "Five"
    EngNum(6) = "Six"
```

```
 EngNum(7) = "Seven"
 EngNum(8) = "Eight"
 EngNum(9) = "Nine"
 EngNum(10) = "Ten"
 EngNum(11) = "Eleven"
 EngNum(12) = "Twelve"
 EngNum(13) = "Thirteen"
 EngNum(14) = "Fourteen"
 EngNum(15) = "Fifteen"
 EngNum(16) = "Sixteen"
 EngNum(17) = "Seventeen"
 EngNum(18) = "Eighteen"
 EngNum(19) = "Nineteen"
 EngNum(20) = "Twenty"
 EngNum(30) = "Thirty"
 EngNum(40) = "Forty"
 EngNum(50) = "Fifty"
 EngNum(60) = "Sixty"
 EngNum(70) = "Seventy"
 EngNum(80) = "Eighty"
 EngNum(90) = "Ninety"

'** Copy amount passed to a string with leading zeroes.
strNum = Format(AmountPassed, "000000000.00")

'** Put last two digits in Pennies variable for later use.
Pennies = Mid(strNum, 11, 2)

'Set starting values for some local variables.
English = ""
LoopCount = 1
StartVal = 1

'** Now do each 3-digit section of number.
Do While LoopCount <= 3
   Chunk = Mid(strNum, StartVal, 3)     '3-digit chunk
   Hundreds = Val(Mid(Chunk, 1, 1))     'Hundreds portion
   Tens = Val(Mid(Chunk, 2, 2))         'Tens portion
   Ones = Val(Mid(Chunk, 3, 1))         'Ones portion

   '** Do the hundreds portion of 3-digit number
   If Val(Chunk) > 99 Then
      English = English & EngNum(Hundreds) & " Hundred "
   End If

   '** Do the tens & ones portion of 3-digit number
   TensDone = False
   '** Is it less than 10?
   If Tens < 10 Then
      English = English & " " & EngNum(Ones)
      TensDone = True
   End If

   '** Is it a teen?
   If (Tens >= 11 And Tens <= 19) Then
      English = English & EngNum(Tens)
      TensDone = True
      End If
      '** Is it evenly divisible by 10?
      If (Tens / 10) = Int(Tens / 10) Then
         English = English & EngNum(Tens)
         TensDone = True
      End If
      '** Or is it none of the above?
      If Not TensDone Then
         English = English & EngNum((Int(Tens / 10)) * 10)
         English = English & " " & EngNum(Ones)
      End If

      '** Add the word "Million" if necessary
      If AmountPassed > 999999.99 And LoopCount = 1 Then
         English = English + " Million "
      End If

      '** Add the word "Thousand" if necessary
      If AmountPassed > 999.99 And LoopCount = 2 Then
         English = English + " Thousand "
      End If

      '** Do pass through next three digits
      LoopCount = LoopCount + 1
      StartVal = StartVal + 3
   Loop

   '** Done: Return English with Pennies/100 tacked on
   NumWord = Trim(English) & " and " & Pennies & "/100"
End Function
```

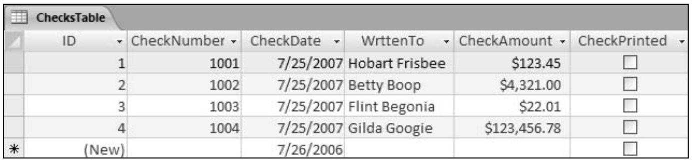
You can test any custom function you create right at the Immediate window. For example, to test the `NumWord()` function, you'd use a question mark followed by a space and then `NumWord` with some number you want to convert to words. For example, suppose you type the following and press Enter:

```
? NumWord(123456.78)
```

`NumWord()` does its thing and spits back the result:

```
One Hundred Twenty Three Thousand Four Hundred Fifty Six and 78/100
```

Of course, in real life, you'd most likely use `NumWord()` in a database that has the ability to print checks. For example, suppose that in the same database as the `NumWord()` function, you have a table like the one in Figure 3-8 that contains information for writing checks.



ChecksTable

ID	CheckNumber	CheckDate	WrttenTo	CheckAmount	CheckPrinted
1	1001	7/25/2007	Hobart Frisbee	$123.45	☐
2	1002	7/25/2007	Betty Boop	$4,321.00	☐
3	1003	7/25/2007	Flint Begonia	$22.01	☐
4	1004	7/25/2007	Gilda Googie	$123,456.78	☐
(New)		7/26/2006			☐

Figure 3-8: Table of data for printing checks.

Next you'd need to create a report format that can print on pre-printed checks. Most of the controls on that report come straight from the table, except that you need one calculated control to print the check amount in words. That calculated control uses the expression `=NumWord(CheckAmount)`. In other words, it uses the `NumWord()` function in the same way you use a built-in Access function. Figure 3-9 shows what that report design looks like.

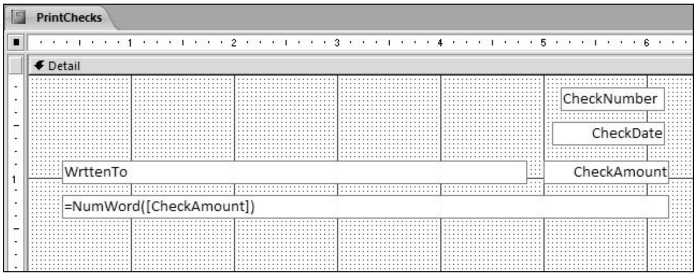


Figure 3-9: Report format for printing checks.

Of course, the tricky thing is getting all the boxes on the report format to line up correctly with areas on the pre-printed checks, but that's something you do in the report design. VBA is out of the loop on that part of the deal. The `NumWord()` function just saves you from having to hand-write the check amounts in words on all of the printed checks.

Chapter 4: Controlling Forms with VBA

In This Chapter

- **Displaying — and responding to — custom messages**
- **Opening a form with the `DoCmd` object**
- **Changing form controls with VBA**
- **Using objects and collections in code**

When you create a database for other people to use, making things as automatic as possible is to your advantage. The more automated your overall database, the less likely *users* — the people who actually use the database — will make mistakes (even if the user is you!). This chapter explores some techniques for using Visual Basic for Applications (VBA) to display custom messages to users, to automatically open and close forms, to change form controls, and more.

Displaying Custom Messages

In your day-to-day work with your computer, programs occasionally pop little messages on-screen to ask you questions, such as, `"Are you sure you want to delete . . .?"` You can then click the Yes or OK button to delete, or click the No or Cancel button to change your mind. You can add similar custom messages to your database.

Displaying a message box

As we discuss in Chapter 2 of this minibook, VBA can also display custom messages. By using a variable and the `MsgBox()` function, you can display a question and then have VBA perform some task based on the user's answer to that question. The syntax for creating such an interactive message box is

```
Dim myVar as Byte
myVar = MsgBox(prompt[, buttons] [, title])
```

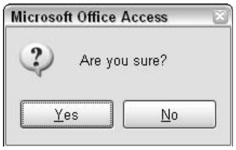
where the `Dim` statement defines a variable as the Byte data type, a number in the range of 0 to 255. *`myVar`* is any variable name of your choosing, *`prompt`* is the text of the message, and *`title`* is the text to appear in the title bar of the message. The *buttons* argument is a constant, or sum of constants, that specify the buttons and icons to show in the box, as summarized in Table 4-1.

Table 4-1 Constants Used for the MsgBox Buttons Argument

Constant	*Description*
vbOKOnly	Display OK button only
vbOKCancel	Display OK and Cancel buttons
vbAbortRetryIgnore	Display Abort, Retry, and Ignore buttons
vbYesNoCancel	Display Yes, No, and Cancel buttons
vbYesNo	Display Yes and No buttons
vbRetryCancel	Display Retry and Cancel buttons
vbCritical	Display Critical icon
vbQuestion	Display Question icon
vbExclamation	Display Warning icon
vbInformation	Display Information icon

For example, the following statement shows a message box that contains a Question icon and Yes and No buttons. Figure 4-1 shows the message box that the code displays when executed.

```
Dim myVar as Byte
myVar = MsgBox("Are you sure?",vbYesNo+vbQuestion)
```


Microsoft Office Access

Are you sure?

Figure 4-1: Sample MsgBox message.

When someone clicks a button in the message box, the variable (myVar in this example) receives a value. That value tells you which button the person clicked, as summarized in Table 4-2.

Table 4-2 Values That MsgBox Passes to the Variable

Button Clicked	*Variable Receives*	*Numeric Value*
OK	vbOK	1
Cancel	vbCancel	2
Abort	vbAbort	3

Button Clicked	Variable Receives	Numeric Value
Retry	vbRetry	4
Ignore	vbIgnore	5
Yes	vbYes	6
No	vbNo	7

Responding to what the user clicks

By using decision-making code, you can then have your VBA procedure do something when someone clicks a button on your message box, based on the contents of the myVar variable. For example, the sample message box displays a Yes button and a No button. If the user clicks the Yes button, myVar contains vbYes (or 6). If the user clicks the No button, myVar contains vbNo (or 7). The skeletal structure of the code that decides what to do — based on the button clicked (where Do these statements . . . can be any number of VBA statements) — is the following:

```
'Show a message box with Yes and No buttons.
Dim myVar as Byte
myVar = MsgBox("Are you sure?",vbYesNo+vbQuestion)
'Decide what to do next based on button clicked in box.
If myVar = vbYes Then
   'Do these statements if Yes
Else
   'Do these statements if No
End If
```

You can use either the constant or the numeric value to refer to the contents of the myVar variable. The following code works exactly the same as the preceding code:

```
'Show a message box with Yes and No buttons.
Dim myVar as Byte
myVar = MsgBox("Are you sure?",vbYesNo+vbQuestion)
'Decide what to do next based on button clicked in box.
If myVar = 6 Then
   'Do these statements if Yes
Else
   'Do these statements if No
End If
```

If you need three buttons, you can use a Select Case statement to choose what to do. For example, the following code displays a message box with Yes, No, and Cancel buttons. The Select Case block of code then decides what to do based on the button that was clicked. (Again, Do these statements . . . represents any number of VBA statements.)

```
 'Show a message box with Yes, No, and Cancel buttons.
Dim myVar as Byte
myVar = MsgBox("Overwrite?",vbYesNoCancel+vbQuestion)
'Decide what to do next based on button clicked in box.
Select Case myVar
   Case vbYes
      'Do these statements if Yes clicked
   Case vbNo
      'Do these statements if No clicked
   Case vbCancel
      'Do these statements if Cancel clicked
End Select
```

Message boxes are handy for presenting short little messages on-screen. Often, though, you want your code to open an entire form.

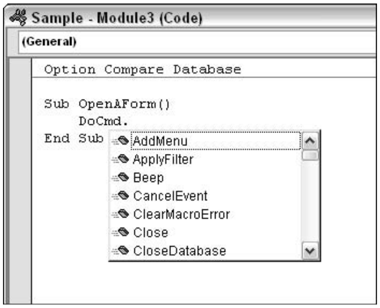
Opening Forms with DoCmd

Although you can access countless objects in VBA, the `DoCmd` object (pronounced *do command*) is one of the easiest and handiest for manipulating Access objects. The `DoCmd` object gives you access to all the commands — including options on all menus, toolbars, and shortcut menus — found in the Access program window. The basic syntax of a `DoCmd` statement is as follows:

```
DoCmd.methodName(arglist)
```

where *`methodName`* is any method that's supported by the `DoCmd` object, and *`arglist`* represents required and optional arguments that a given method accepts.

Like with any VBA keyword, as soon as you type `DoCmd` into the Code window, a menu of acceptable words that you can type next appears, as shown in Figure 4-2. Use the scroll bar at the right side of the list to see all your options.



```
Option Compare Database

Sub OpenAForm()
    DoCmd.
End Sub
```

Figure 4-2: Sample drop-down menu that appears as you type in VBA.

Of course, you can also use the VBA Help system to find more information on the DoCmd object and its methods. For instance, type DoCmd in the Type a question for help box in the VBA editor. Then click the DoCmd Object option to get help with that object.

Umpteen ways to open a form

Although many methods are available to choose from in the DoCmd object, the OpenForm method provides a good example. The syntax of the OpenForm method is

```
DoCmd.OpenForm FormName, [View], [FilterName],
   [WhereCondition], [DataMode], [WindowMode], [OpenArgs]
```

where

- *FormName* represents the name of the form that you want to open.
- *View* represents the view in which you want to open the form using the built-in constants:
  - acNormal: Form view. This view is used if you omit the View argument in the statement.
  - acDesign: Design view.
  - acFormDS: Datasheet view.
  - acFormPivotChart: PivotChart view.
  - acFormPivotTable: PivotTable view.
  - acPreview: Print Preview.
- *FilterName* specifies the name of a query within the current database, which limits records displayed by the form. If omitted, no query filter is applied.
- *WhereCondition* represents an expression, enclosed in quotation marks, that specifies records to include. If omitted, all records are available. For example, entering a WhereCondition such as "[State] = 'CA' " displays only records that have CA in the State field.
- *DataMode* specifies the data entry mode in which the form opens, using one of the following constants:
  - acFormatPropertySettings opens the form in its default view as specified in the form's AllowEdits, AllowDeletions, AllowAdditions, and DataEntry properties. If you don't specify a DataMode argument in the statement, this setting is used by default.
  - acFormAdd: Opens the form with the ability to add new records enabled and the cursor in a new, empty record

  - acFormEdit: Opens the form with the ability to edit records contained within the table
  - acFormReadOnly: Opens the form in read-only mode, so the user can view, but not change, the data

- *WindowMode* specifies the appearance of the form window upon opening, using any of the following options:
  - acWindowNormal: Opens the form in its normal view. If you omit this argument, acWindowNormal is the setting that's applied automatically.
  - acDialog: Opens the form by using a fixed-size, dialog-box-style border.
  - acHidden: Opens the form so that the code can have access to the form's controls and data but doesn't make the form visible on-screen.
  - acIcon: Opens the form minimized to an icon in the Access program window.
- *OpenArgs* can be used to pass data to the form's class module, where other code can use it.

When you type a DoCmd.OpenForm statement into the Code window, the Quick Info syntax chart keeps you posted on which argument you're currently typing (by showing that argument in boldface). When you get to an argument that requires a constant, the Code window displays a drop-down list of acceptable constants. You can just double-click, rather than type, the constant that you want to use.

Look at some examples of using the OpenForm method of the DoCmd object. The following line opens a form named Products Form:

```
DoCmd.OpenForm "Products Form"
```

Macros and the DoCmd object

Access macros (Book VI) use the DoCmd object to carry out most of their actions. Often, you can use macros to write a series of DoCmd statements without the complexities of manually typing each statement by hand. Create a macro to do whatever you want your code to do. Then convert the macro to VBA code, as we discuss in Chapter 1 of this minibook. When you open the converted macro in VBA Editor, you see that most, if not all, of its actions are converted to DoCmd statements. You can then cut and paste those statements into some other procedure that you're writing. Or, just add any necessary code to the converted macro.

Because no optional arguments are specified, no filter is applied, and all other optional settings take on their default values. Opening the form by double-clicking its name in the Database window accomplishes the same thing.

The following statement opens a form named `Products Form`, displaying only those records where the `Selling Price` field contains a number greater than 100:

```
DoCmd.OpenForm "Products Form", , , "[Selling Price] > 100"
```

The following statement opens a form named `Sales Tax Calcs` with the `Window Mode` property set to the dialog box style:

```
DoCmd.OpenForm "Sales Tax Calcs", , , , , acDialog
```

As you can see, the `DoCmd` object offers a lot of flexibility in specifying how you want to open a form. The same is true of many other methods of the `DoCmd` object. These few examples don't even come close to showing all the variations. The important thing is knowing that the `DoCmd` object exists and that you can perform many Access actions on objects within your database.

Closing a form with DoCmd

Just like you can open a form with `DoCmd`, you can also close it. The syntax to close an object using `DoCmd` is

```
DoCmd.Close(ObjectType, ObjectName, Save)
```

Each argument in the syntax represents the following:

- *ObjectType*: The type of object that you want to close expressed using one of the available constants, such as `acForm`, `acReport`, `acTable`, `acQuery`
- *ObjectName*: A string expression that identifies an object currently open
- *Save*: One of the following constants:
  - `acSaveNo`: Closes the object without saving any changes
  - `acSavePrompt`: (Default) Displays the standard "Do you want to save . . ." message so the user can choose whether to save
  - `acSaveYes`: Saves all changes to the form and then closes it

If you want to close a form, from code, and save the user's changes without prompting, use the following syntax:

```
DoCmd.Close acForm, formName, acSaveYes
```

where *formName* is the name of the form that you want to close. If you want a line of code to close a form named `Products Form`, the syntax is

```
DoCmd.Close acForm, "Products Form", acSaveYes
```

Changing Form Controls with VBA

When a form is open, you can use VBA code to change the contents and even the appearance of the form — from the big picture down to the individual controls on the form. Suppose you have a form that includes a control for choosing a payment method. When the user chooses a payment method, you want to enable or disable other controls on the form based on the selected payment method. Or, you might want to auto-fill some other controls on the form. You might even want to make some controls visible or invisible, depending on which payment method the user selected.

Figure 4-3 shows a few examples. When the user selects `Cash`, the `Paid` field is marked `True` and all other fields are disabled. When the user selects `Credit Card`, the fields for entering credit card information are enabled. When the user selects `Purchase Order`, the P.O. Number control is enabled and the Paid check box is emptied.

Within VBA, use the following syntax to change a control's property:

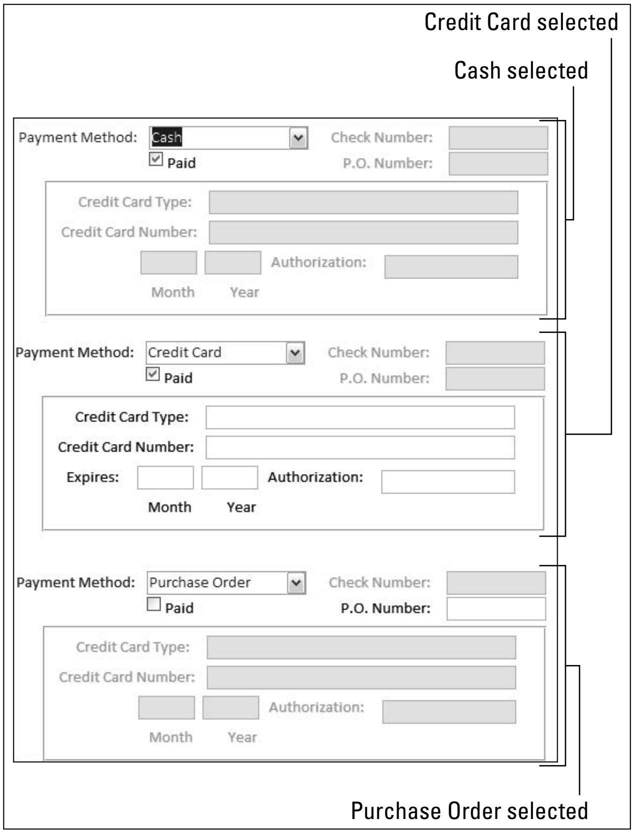
```
ControlName.PropertyName = Value
```

where *ControlName* is the complete name of a control on an open form, *PropertyName* is the name of the property that you want to change, and *Value* is the new value for the property. A dot separates the control name from the property name. The complete name means that the name has to contain both the name of the form and the name of the control. However, in a class module, you can use the keyword `Me` to stand for the form name. The keyword `Me` means "the form to which this class module is attached."

Some cool control properties

To make a control invisible, use the following syntax:

```
Me.ControlName.Visible = False
```



Credit Card selected

Cash selected

Payment Method: Cash

☑ Paid

Payment Method: Credit Card

☑ Paid

Payment Method: Purchase Order

□ Paid

Purchase Order selected

Figure 4-3: Enabling/ disabling controls with VBA.

To make the control visible, use the syntax

```
Me.ControlName.Visible = True
```

To disable a control so that it's dimmed and doesn't respond to mouse clicks or the keyboard, set the control's `Enabled` property to a `False` value as below:

```
Me.ControlName.Enabled = False
```

To set the control back to its normal `Enabled` status, use this syntax:

```
Me.ContolName.Enabled = True
```

To change the value (contents) of a control, set the control's `Value` property equal to the value you want to put in that control. Here's the syntax:

```
Me.ControlName.Value = desiredValue
```

Why not just show everything?

In case you're wondering why we don't show all the methods of the DoCmd object, or all the objects, properties, and methods available in all the object libraries, the truth of the matter is this: It's too many words. No, we're not too lazy to type that many words. Rather, there aren't enough pages in this entire book to fit that many words.

The sheer quantity of information makes remembering every detail of every VBA statement and object nearly impossible, so it wouldn't do much good to print that information here anyway. Even professional programmers spend a lot of time looking up the syntax of keywords and objects in the Help system (or the Object Browser). The sooner you become fluent in using the VBA Editor's Help or the Object Browser (or both), the better off you are. See Chapters 1 and 2 of this minibook for more information on the Object Browser and VBA Help.

The *desiredValue* part has to be an appropriate data type for the control. For example, suppose there's a control named Paid on the form that's bound to a Yes/No field in the underlying table. The statement below makes that control True, thereby putting a check mark in its check box:

```
Me.Paid.Value = True
```

To clear that check mark, use

```
Me.Paid.Value = False
```

To insert new text into a text box, use the standard syntax but enclose the new text in quotation marks. For example, if the current form has a Text Box control named Product Name that's bound to a Text field, the statement below puts the text in quotation marks into that control:

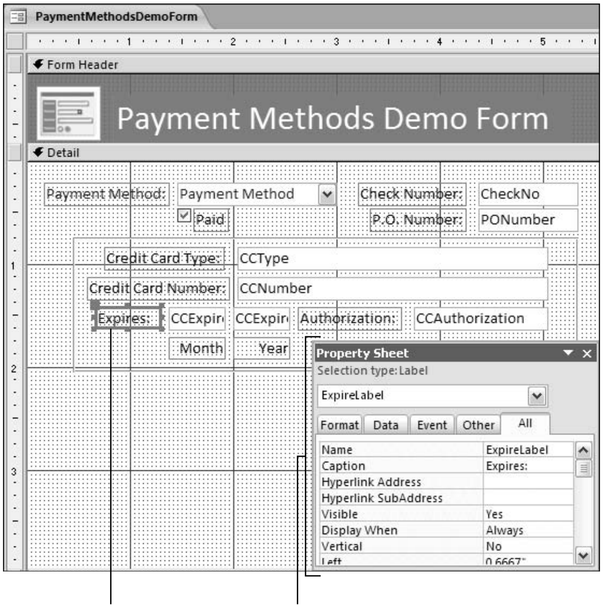
```
Me.ProductName.Value = "9-Passenger Lear Jet"
```

To increase or decrease a value in a numeric field, set the Value property of its control to an expression that does the appropriate math. Suppose that a form contains a UnitPrice control that's a Currency field. The following statement increases that control's current value by 10 percent:

```
Me.UnitPrice.Value = 1.10 * Me.UnitPrice.Value
```

Controlling properties example

Take a look now at how you might use the above techniques to control what happens to controls in the payment method example shown near the start of this chapter. Figure 4-4 shows those controls on a form, in Design view, so that you can see the actual control names. The `Label` control named `ExpireLabel` doesn't show a name, so we've pointed that one out. We've also selected that control — and are showing its Property sheet — so you can see its `Name` property and some of the other properties it offers. The Property sheet for a control is how you find out exactly what properties the control offers.



Property Sheet

Selection type: Label

ExpireLabel

Format | Data | Event | Other | All

Name	ExpireLabel
Caption	Expires:
Hyperlink Address	
Hyperlink SubAddress	
Visible	Yes
Display When	Always
Vertical	No
Left	0.6667"

Selected control (ExpireLabel)

Properties of selected control

Figure 4-4: Properties of a control in Design view form.

The Payment Method control in the example is named `Payment Method`. It's a combo box that allows the user to choose one of four possible payment methods: Cash, Check, Credit Card, or Money Order. As soon as the user makes a selection from that combo box, we want some VBA code to change some other controls. In particular, we want it to disable controls that aren't relevant to the selected payment method. We can also have it mark the `Paid` field as `False` when Purchase Order is selected. And just as an example, we'll have it hide the `ExpireLabel` control when the user selects anything except Credit Card.

So the first question is, when should this custom VBA code be executed? The `After Update` event is the best event for this situation because that event occurs after a new value is selected, and any validation criteria for the field have already been met. So in this case, you click the `Payment Method` control (in Design view) to select it. If the Property sheet isn't already open, right-click that control and choose Properties. Click the Event tab in the Property sheet. Click the `After Update` event, click its Build button, and then choose the Code Builder from the dialog box that appears, as illustrated in Figure 4-5.

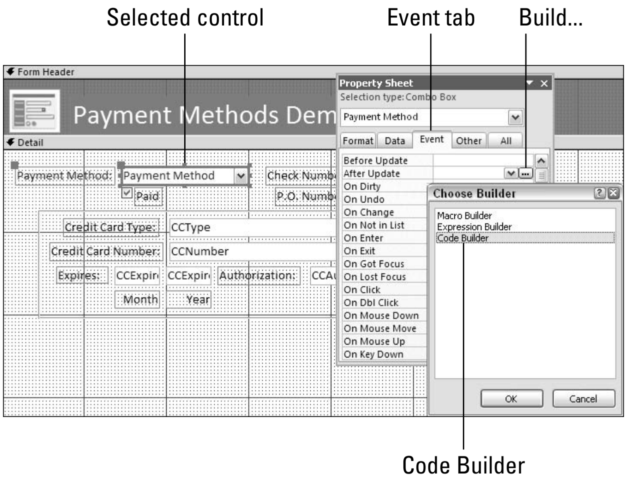


Figure 4-5: Manually creating an event procedure.

After you click Code Builder and OK in the Choose Builder dialog box, the class module for the form opens. The first and last lines of the procedure are already typed in for you. In this example, the lines look like this in the module:

```
Private Sub Payment_Method_AfterUpdate()
End Sub
```

When writing the procedure, be sure to put all the lines between the `Private Sub` and `End Sub` statements. We typed in the necessary code in the following block. Just to make things even fancier, we threw in a few `DoCmd.GoToControl` statements to position the cursor to the next control that the user would likely type in next. For example, the statement `DoCmd.GoToControl "CCType"` means "move the blinking cursor into the control named `CCType`."

```
Private Sub Payment_Method_AfterUpdate()
   'First, disable controls and hide the label,
   'to create a simple starting point.
   Me.CheckNo.Enabled = False
   Me.PONumber.Enabled = False
   Me.CCType.Enabled = False
   Me.CCNumber.Enabled = False
   Me.CCExpireMonth.Enabled = False
   Me.CCExpireYear.Enabled = False
   Me.CCAuthorization.Enabled = False
   Me.ExpireLabel.Visible = False

   'Now selectively show and enable controls,
   'and fill the Paid field, based on the
   'contents of the Payment Method control
   Select Case Me.[Payment Method].Value

      'If selection is Cash...
      Case "Cash"
         Me.Paid.Value = True

      'If selection is Check...
      Case "Check"
         Me.CheckNo.Enabled = True
         Me.Paid.Value = True
         'Move cursor to CheckNo control
         DoCmd.GoToControl "CheckNo"

      'If selection is Credit Card...
      Case "Credit Card"
         Me.CCType.Enabled = True
         Me.CCNumber.Enabled = True
         Me.CCExpireMonth.Enabled = True
         Me.CCExpireYear.Enabled = True
         Me.CCAuthorization.Enabled = True
         Me.ExpireLabel.Visible = True
         Me.Paid.Value = True
         'Move cursor to CCType control
         DoCmd.GoToControl "CCType"

      'If selection is Purchase Order...
      Case "Purchase Order"
         Me.PONumber.Enabled = True
         Me.Paid.Value = False
         'Move cursor to PONumber control
         DoCmd.GoToControl "PONumber"

   End Select
End Sub
```

The code and comments should be fairly easy to read. For starters, the sub procedure name, `Payment_Method_AfterUpdate()`, tells you that this

Looks can be deceiving

When you create a lookup field, what you see in that field may not match what Access has actually stored in the field. For example, you may have a ContactID field that shows a customer name in the format Jones, Hank. But Access actually stores that person's ContactID as a number (perhaps 39 or whatever).

VBA sees what Access sees — the ContactID number in the preceding example, not the name. Any code that you write needs to take that into consideration. To create an If statement that makes a decision based on the contents of the ContactID field, use something like this:

```
If Me.ContactID.Value = 39
```

If you use the following statement instead, the code either generates an error message or perhaps doesn't give the result that you think it should:

```
If Me.ContactID.Value =
"Jones. Hank"
```

You can add a Debug.Print statement to your code and run it from the Immediate window to see what type of data is stored in a control. For example:

```
Debug.Print
Me.ContactID,Value
```

displays the contents of the ContactID control. If that's a number, you know that the ContactID field in every record contains a number.

code executes after a user makes a selection from the Payment Method control, and Access accepts that change.

The first lines under the Sub statement disable most controls and hide the expiration label, just so that we know the status of each control before the Select Case statement executes.

The Select Case Me.[Payment Method].Value statement uses the value (contents) of the Payment Method control to make a decision about which controls to enable and make visible. When the Cash option is selected, only this code is executed, filling the Paid check box with a check mark:

```
Case "Cash"
   Me.Paid.Value = True
```

When the Check option is selected, the following lines execute to enable the CheckNo control, place a check mark in the Paid check box, and move the cursor to the CheckNo control:

```
        Case "Check"
           Me.CheckNo.Enabled = True
           Me.Paid.Value = True
           'Move cursor to CheckNo control
           DoCmd.GoToControl "CheckNo"
```

And so it goes, each `Case` statement modifying certain controls and positioning the cursor based on the current value of the `Payment Method` control.

After typing in the code, close the Code window and Visual Basic Editor to return to your form. There you can save the form, open it in Form view, and try out your code.

TIP

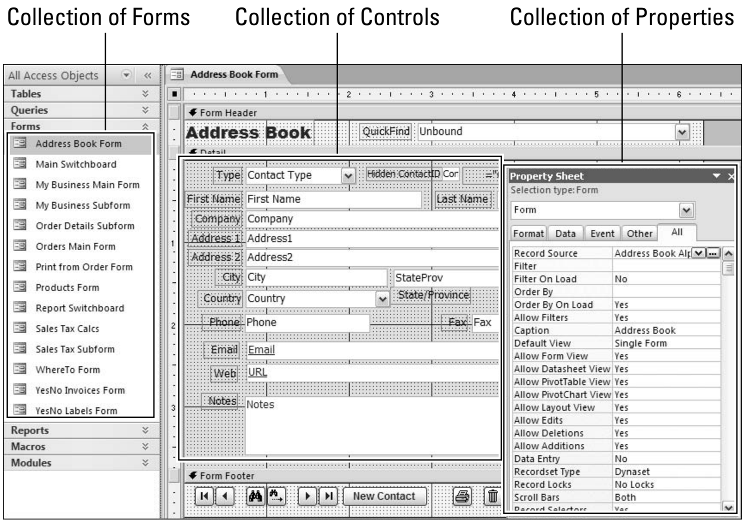
If you have difficulty with your own code, you may find some of the debugging techniques described in Chapter 6 of this minibook useful for diagnosing and fixing problems.

Understanding Objects and Collections

Working with controls on a form or report from within a class module is greatly simplified by the `Me` keyword, which refers to the form or report to which the class module is attached. Things become more complicated when you write code in standard modules, where the keyword `Me` doesn't refer to anything because a standard module isn't attached to any particular form or report. The moment you step outside a class module, you have to think more in terms of the object models.

As you (hopefully) know, just about everything you work with in Access is an object — tables, queries, and forms are all objects. Some objects are very much alike; tables are alike in that they all contain data. Forms are alike in that they all present data from tables in a certain format. A group of like objects forms a *collection.* For example, all the tables within your database represent that database's tables collection.

In some cases, a single object may be a collection as well. A single form is one object in the collection of forms, but a single form is also a collection in its own right — a collection of controls. Each control on a form is also an object in its own right, but even a single control is a collection. A control has lots of properties, as you can see on any control's Property sheet in Design view. Figure 4-6 shows how a collection is a bunch of objects that have something in common, and how any given object can also be a collection.



Property Sheet

Selection type: Form

Form

Format | Data | Event | Other | All

Record Source	Address Book Alp
Filter	
Filter On Load	No
Order By	
Order By On Load	Yes
Allow Filters	Yes
Caption	Address Book
Default View	Single Form
Allow Form View	Yes
Allow Datasheet View	Yes
Allow PivotTable View	Yes
Allow PivotChart View	Yes
Allow Layout View	Yes
Allow Edits	Yes
Allow Deletions	Yes
Allow Additions	Yes
Data Entry	No
Recordset Type	Dynaset
Record Locks	No Locks
Scroll Bars	Both
Record Selectors	Yes

Figure 4-6: Collections are everywhere in Access.

Properties, methods, and events

All objects have some combination of properties, methods, and events. Objects in the real world as well as objects in Access have properties, methods, and events. You can describe a car in terms of its properties (make, model, size, color, and so forth), methods (you drive a car), and events (you press the brake pedal, which causes a series of actions that slow the car down). But getting back to Access, we define those terms as follows:

- **Property:** A *property* of an object (or collection) is some characteristic of that object, such as size, color, font, and so forth.
- **Method:** A *method* is something that you can do to the object. Every form has an `Open` method and a `Close` method because you can open and close forms. (The `DoCmd` object that we mention earlier in this chapter provides access to the methods provided by most Access objects.)
- **Event:** An *event* is something that happens to an object. When you click a button on a form, you trigger its `On Click` event (or `Click` event).

Virtually everything in Access is an object that has properties, methods, and events. If you open a form in Design view, you can click any control to see its properties in the Property sheet. If the Property sheet isn't open, press Alt+Enter or right-click a control and choose Properties.

Many objects support methods. For example, if you right-click a form name in the shutter bar, you see a shortcut menu like the one in Figure 4-7. Most of the items you see on the shortcut menu are methods — things you can do to the object.

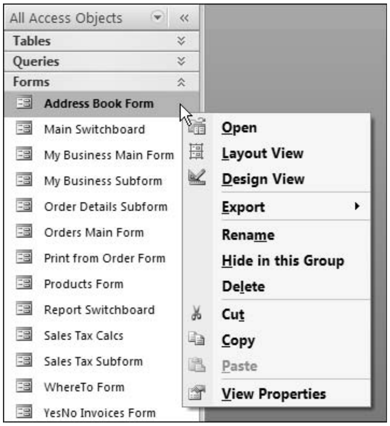


Figure 4-7: Form methods.

Of course, when you're working in VBA, the visual interactive tools that Access offers — tools such as shortcut menus and Property sheets — aren't visible. In VBA, you write code to access collections, objects, properties, methods, and events.

Referring to objects and collections

Manipulating an object through VBA code starts with a two-step process:

1. **Declare an object variable (by using `Dim`) as the appropriate object or collection type.**
2. **Set the object variable (by using the `Set` keyword) to a specific object or collection within your database.**

The syntax of the statements for performing those two steps looks like this:

```
Dim anyName As objectType
Set anyName = specificObject
```

where *`anyName`* is a variable name of your choosing, the *`objectType`* is one of the keywords shown in the first column of Table 4-3, and *`specificObject`* represents a specific named object.

Table 4-3 Common Types for Object Variables

Object Type	*Use to Declare*
`AccessObject`	Any type of Access object in `AllForms`, `AllReports`, and other collections
`Form`	A form
`Report`	A report
`Control`	A control on a form or report
`Property`	A property of an object
`RecordSet`	A group of records (see Chapter 5 of this minibook)

At the highest level of the object model, you can use the `AllForms`, `AllReports`, and other collections contained within the `CurrentProject` object to refer to any form or report — even forms and reports that aren't open. Each object in those collections has a general type called `AccessObject`.

TIP

For a detailed explanation of the `CurrentProject` object and the collections it supports, look up the `CurrentProject` object in the VBA Editor's Help and look at the `CurrentProject Object` link.

If you want to create a reference to a form named `Products Form`, in code, and give that form a short variable name, like `myForm`, declare `myForm` as an `AccessObject`. Then set that variable's value to the form by using the syntax `Set myForm = CurrentProject.AllForms("FormName")`, as the following shows:

```
Dim myForm As AccessObject
Set myForm = CurrentProject.AllForms("Products Form")
```

After the code runs, the variable named `myForm` refers to the form named `Products Form`.

An example: Seeing whether a form is open

You can create a custom VBA function that uses a collection and an object variable. You can prevent your code and macros from opening multiple copies of a form. The name of this custom function is `isOpen()` and is shown in Figure 4-8.

The `isOpen()` function is stored in a standard module, rather than a class module, so you can access it freely from anywhere in your database.

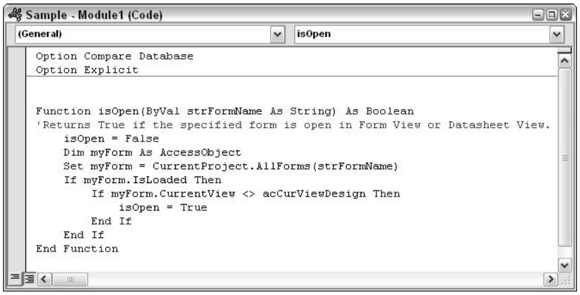
You use the `isOpen()` custom function, just like you would a built-in function, by passing a form name to the function, as the following shows:

```
isOpen("Products Form")
```

Naming conventions for object variables

In this chapter, we use the letters `my` at the start of variable names, just to provide some consistency. Some programmers, however, follow certain naming conventions, replacing the letters `my` with a tag that represents the object type that the variable refers to. If an object variable refers to an `AccessObject`, programmers may use `obj` as the first letters of an object variable name, as in `Dim objForm as AccessObject`. Some may use `ctl` as the first letters of an object variable that refers to a control, as in `Dim ctlProductID as Control`.

Naming conventions are especially useful in large projects where many different programmers work with code. They help identify the object type each variable refers to. However, naming conventions are also entirely optional. Don't feel that you must use them in your own code.



```
Option Compare Database
Option Explicit


Function isOpen(ByVal strFormName As String) As Boolean
'Returns True if the specified form is open in Form View or Datasheet View.
    isOpen = False
    Dim myForm As AccessObject
    Set myForm = CurrentProject.AllForms(strFormName)
    If myForm.IsLoaded Then
        If myForm.CurrentView <> acCurViewDesign Then
            isOpen = True
        End If
    End If
End Function
```

Figure 4-8: The `IsOpen()` function determines if a form is open.

When called, the `isOpen()` function returns `True` if the specified form is open or `False` if the specified form is closed. The first statement of the `isOpen()` function is the following:

```
Function IsOpen(FormName As String) As Boolean
```

which defines the name of the function as `isOpen`, accepting a single string value that is referred to as `FormName` within the procedure. This custom function returns either `True` or `False` (a Boolean value).

The `ByVal` keyword, used in front of an argument name in a `Sub` or `Function` statement, passes the value directly instead of as a reference to the object. `ByVal`, although optional, can speed the processing.

The next line sets the initial value to be returned by the function to `False`. Later code in the procedure turns that to `True` if the form is open in Form or Datasheet view:

```
isOpen = False
```

The next line in the code declares an object variable named `myForm` and sets its type to `AccessObject`:

```
Dim myForm As AccessObject
```

The next line then makes the `myForm` object variable refer to the specific form, based on the name that passes to the function:

```
Set myForm = CurrentProject.AllForms(strFormName)
```

If you call the function by using `isOpen("Products Form")`, the variable name `myForm` refers to the Products Form after the line is executed.

The next statement uses the built-in `IsLoaded` property to determine whether the form is open. If the form is open, `isLoaded` returns `True`. If the form is closed, `isLoaded` returns `False`:

```
If myForm.IsLoaded Then
```

If (and only if) the form is indeed open, the next statement uses the `CurrentView` property to see whether the form is currently open in Design view. (`CurrentView` is a property of all form objects; `acCurViewDesign` is a constant that means "currently open in Design view"):

```
If myForm.CurrentView <> acCurViewDesign Then
```

If (and only if) the form is open — but not open in Design view — the following statement sets `isOpen` to `True`. If the form isn't open or is open in Design view, the next line doesn't execute, so `isOpen` retains its original value of `False`:

```
isOpen = True
```

The rest of the procedure just contains an `End If` statement for each `If` block, and the `End Function` statement to mark the end of the procedure.

To see some practical uses of the custom `isOpen()` function, imagine that you already added that custom function to a standard module in your database. Now you want to use the function to see whether a form is open before you execute code to open that form. In particular, you want the code to see whether `Products Form` is open — and, if it isn't, to go ahead and open the form. Use the following code to open a form:

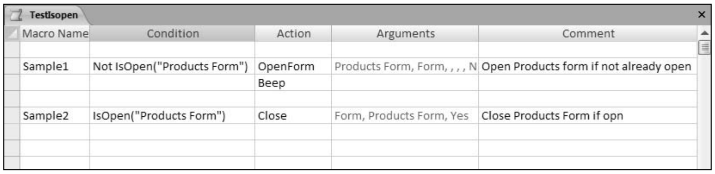
```
'Open Products Form, but only if it isn't open already.
If Not isOpen("Products Form") Then
   DoCmd.OpenForm "Products Form"
End If
```

Suppose you want a procedure to close the form, but you want to make sure the form is indeed open before using `DoCmd.Close` to close the form. In that case, use these statements:

```
'Close Products Form if it is currently open.
If isOpen("Products Form") Then
   DoCmd.Close acForm, "Products Form", acSaveNo
End If
```

In a macro, you can use `isOpen()` in the Condition column to ensure that the macro doesn't try to open a form that's already open. You can also use `isOpen()` to make sure that a form is open before you close it, as shown in Figure 4-9.

Figure 4-9: Using `IsOpen` function in macro Condition column.



Macro Name	Condition	Action	Arguments	Comment
Sample1	Not IsOpen("Products Form")	OpenForm	Products Form, Form, , , , N	Open Products form if not already open
		Beep		
Sample2	IsOpen("Products Form")	Close	Form, Products Form, Yes	Close Products Form if opn

Looping through collections

Access provides a slight variation on the `For...Next` loop, known as the `For Each...Next` loop, that's designed to specifically repeat once for each item within a collection. With each pass through the loop, the object variable used in the `For Each...Next` loop refers to the next object in the collection. The syntax of the `For Each...Next` loop is

```
For Each element In collection
   [statements]
[Exit For]
   [statements]
Next [element]
```

where *element* is an object variable of the appropriate type for the collection, *collection* is the name of a collection, and *statements* are any number of statements to be executed within the loop.

Whether you ever need a For Each...Next loop in your own code depends on how fancy things get. However, if you use other peoples' code, you may come across an occasional For Each...Next loop, so you need to have an idea of what that loop does.

For example, recall that the AllForms collection in the CurrentProject object contains all the forms in the current database. Each form in the collection is a type of AccessObject.

TIP

The Forms collection contains only the forms that are currently open. The AllForms collection includes both closed and open forms.

In the following example, we use the Dim statement to declare an object variable named myForm as an AccessObject. Then we use a For Each...Next loop to loop through the AllForms collection and print the Name property of every form in the database:

```
Dim myForm as AccessObject
For Each myForm In CurrentProject.AllForms
   'Code to be performed on every form.
   Debug.Print myForm.Name
Next
```

Running the code prints the name of each form in the current database to the Immediate window.

Recall, too, that a form is a collection in its own right — a collection of controls. To set up a loop that looks at each control on a form, you first need to make sure that the form is open. Then, define an object variable as the Control element type. The collection name used in the For Each...Next loop needs to be a specific open form.

The following code snippet opens a form named Products Form. The Dim statement creates an object variable, named myCtl, as the generic Control type of object. The For Each...Next loop specifies all the controls on the current form as the collection. With each pass through the loop, the Debug.Print statement prints the name of the current control:

```
DoCmd.OpenForm "Products Form"
Dim myCtl as Control
For Each myCtl In Forms![Products Form]
```

```
   'Code to be performed on every control goes below.
   Debug.Print myCtl.Name
Next
```

A control, as you may recall, is also a collection: A collection of properties defines the control's name, contents, appearance, type, and behavior. If you want to set up a loop that accesses each property that a control supports, first ensure that the form is open. With that accomplished, define an object variable of the `Property` type and use the specific control's name as the collection name in the `For Each...Next` loop, as the following shows:

```
DoCmd.OpenForm "Products Form"
Dim myProp as Property
For Each myProp In Forms![Products Form].[Product Name]
   'Code to be performed on every control goes below.
   Debug.Print myProp.Name & " = " & myProp.Value
Next
```

The first line opens a form named `Products Form`. The next line defines an object variable named `myProp` as the `Property` type. Then the `For Each...Next` loop displays the name and value of every property for the `Product Name` field.

Using With...End With

If you need to change a whole bunch of properties associated with an object, you can save a little typing by using a `With...End With` block. The syntax for the block is

```
With objectName
.property = value
End With
```

where `objectName` is the name of an open object, or the object variable name that points to the object; `.property` is a valid property for that object; and `value` is the value you want to assign to that object. Assuming that `myCtl` refers to a control on an open form, as in the following example, you can use a `With myCtl...End With` block to change several properties of that control:

```
Dim myCtl As Control
Set myCtl = myForm.[Selling Price]
With myCtl
   .Visible = True
   .SpecialEffect = Flat
   .FontBold = True
   .Value = 1.1 * myCtl
End With
```

The With...End With block changes the Visible property of the Selling Price control to True, sets its Special Effect property to Flat, sets its font to bold, and increases the value stored in that field by 10 percent.

As in the case of the For Each...Next loop, the With...End With statement is optional and not something you must use in any code you write. Our main purpose is to take the mystery out of it in case you should ever come across With...End With in someone else's code.

Chapter 5: Using SQL and Recordsets

In This Chapter

- **Creating quick and easy recordsets**
- **Using SQL to create recordsets**
- **Running action queries from VBA code**

Working with data in tables and queries through Visual Basic for Applications (VBA) is — in a word — weird. You don't exactly work with a table or query directly in VBA. Instead, you work with a recordset. As the name implies, a *recordset* is a set of records. A recordset can be all the records in a given table, all the records in the results of a query involving two or more tables, or a subset of particular records from any table or query. In other words, a recordset can contain any records from any tables you want.

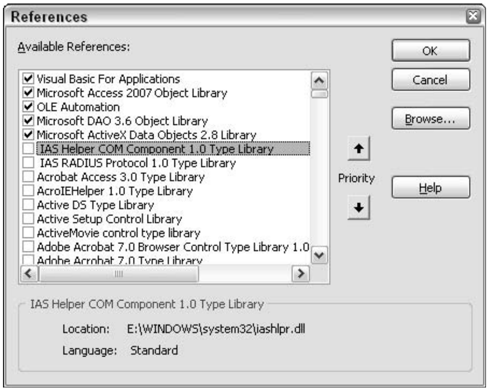
Recordsets and Object Models

Because Access offers two different object models for the purpose of working with recordsets, you may find recordsets confusing. One is DAO (Data Access Objects); the other is ADO (ActiveX Data Objects). The DAO model is the older of the two. DAO works only with Access tables. ADO, the newer of the two, works either with Access tables or external data sources, such as Oracle and Microsoft SQL Server.

At first glance you may think, "Well, I'll never use external data sources, so I'll stick with the DAO object model." Picking an object model, though, isn't that easy. The newer ADO model is currently favored by Microsoft, meaning that ADO will continue to grow and get better while DAO remains in maintenance mode, which generally spells doom for a technology. If a technology is in maintenance mode today, that pretty much guarantees that it won't exist at all in the not-too-distant future.

Given the bias of Microsoft, we stick with ADO in this book. To make sure the stuff that we do in this chapter works on your computer, make sure the ADO object model is loaded in your copy of Access. To do so, open the

Visual Basic Editor, choose Tools➪References from the VBA Editor menu, and select the Microsoft ActiveX Data Objects 2.8 Library option. (See Figure 5-1.) If you don't see that one in your References dialog box, you'll have to scroll down to find it.



Available References:

☑ Visual Basic For Applications
☑ Microsoft Access 2007 Object Library
☑ OLE Automation
☑ Microsoft DAO 3.6 Object Library
☑ Microsoft ActiveX Data Objects 2.8 Library
□ IAS Helper COM Component 1.0 Type Library
□ IAS RADIUS Protocol 1.0 Type Library
□ Acrobat Access 3.0 Type Library
□ AcroIEHelper 1.0 Type Library
□ Active DS Type Library
□ Active Setup Control Library
□ ActiveMovie control type library
□ Adobe Acrobat 7.0 Browser Control Type Library 1.0
□ Adobe Acrobat 7.0 Type Library

IAS Helper COM Component 1.0 Type Library

Location: E:\WINDOWS\system32\iashlpr.dll
Language: Standard

Figure 5-1: The References dialog box.

Because ADO is evolving quickly, you'll likely find several versions of the ActiveX Data Objects library in your References dialog box. Select only the most recent one — the one with the highest version number. Then click OK.

Quick and easy recordsets

If your goal is to create a recordset that contains all the fields and records from a single table in your database, the job is fairly straightforward. Just type the following code, exactly as shown, into a procedure — but replace *`tableName`* with the name of the table that you want to open:

If you don't yet know how to type code into a procedure, see Chapter 2 of this minibook.

```
Dim myConnection as ADODB.Connection
Set myConnection = CurrentProject.Connection
Dim myRecordset as New ADODB.Recordset
myRecordSet.activeConnection = myConnection
myRecordset.Open "tableName", , adOpenStatic, adLockOptimistic
```

After all the lines execute, the `myRecordSet` object variable refers to all the fields and records in whatever table you specified as `tableName` in the last line of code.

ADO recordset properties and methods

Most ADO recordsets support the following methods, which allow you to manipulate the data in the recordset with VBA code:

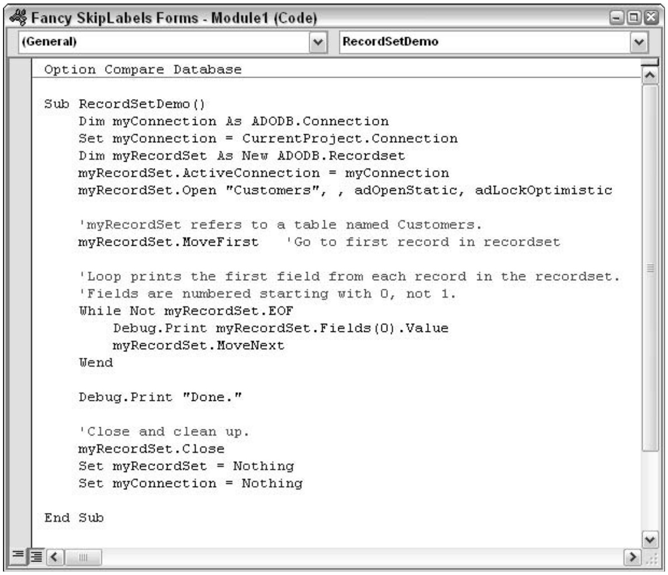
- `.AddNew`: Adds a new, blank record to the recordset
- `.MoveFirst`: Moves the cursor to the first record in the recordset
- `.MoveNext`: Moves the cursor to the next record in the recordset
- `.MovePrevious`: Moves the cursor to the previous record in the recordset
- `.MoveLast`: Moves the cursor to the last record in the recordset
- `.Move` *`numrecords, start`*: Specifies the number of records to move through and the starting point
- `.Open`: Opens a new recordset
- `.Close`: Closes a recordset
- `.Update`: Saves any changes made to the current row of a recordset
- `.UpdateBatch`: Saves all changes made to the current recordset

Some properties you can use to determine the number of records in a recordset, as well as the current position of the cursor within the recordset, are the following:

- `.RecordCount`: Returns the total number of records in the recordset
- `.AbsolutePosition`: Returns a number indicating which row the cursor is in (1 is the first record, 2 is the second record, and so forth.)
- `.BOF`: Beginning Of File; returns `True` when the cursor is above the first record in the recordset
- `.EOF`: End Of File; returns `True` when the cursor is past the last record in the recordset

Looping through a recordset

When a recordset is open, you can use a loop to step through each record within the recordset. As an example, Figure 5-2 shows some code that creates a recordset named `myRecordSet`. The `While...Wend` loop steps through each record in the recordset — one record at a time — and prints the record’s position and the contents of the first couple of fields in each record.



```
Option Compare Database

Sub RecordSetDemo()
    Dim myConnection As ADODB.Connection
    Set myConnection = CurrentProject.Connection
    Dim myRecordSet As New ADODB.Recordset
    myRecordSet.ActiveConnection = myConnection
    myRecordSet.Open "Customers", , adOpenStatic, adLockOptimistic

    'myRecordSet refers to a table named Customers.
    myRecordSet.MoveFirst   'Go to first record in recordset

    'Loop prints the first field from each record in the recordset.
    'Fields are numbered starting with 0, not 1.
    While Not myRecordSet.EOF
        Debug.Print myRecordSet.Fields(0).Value
        myRecordSet.MoveNext
    Wend

    Debug.Print "Done."

    'Close and clean up.
    myRecordSet.Close
    Set myRecordSet = Nothing
    Set myConnection = Nothing

End Sub
```

Figure 5-2: Sample sub procedure loops through records in a recordset.

Needless to say, the code in Figure 5-2 isn't exactly simple. The sections that follow, however, shed some light on some of its meaning.

Flip to Chapter 3 of this minibook to review `While...Wend` loops.

Defining a recordset's cursor type

When you open a table in Datasheet or Form view, you see the blinking cursor and move it around freely using your mouse or keyboard. With recordsets, you can choose from different types of cursors. These types of cursors have nothing to do with how the cursor looks because in a recordset, you can't see the cursor (or the data)! Rather, the cursor type in a recordset defines how the cursor behaves within the recordset. You can define a recordset's cursor type two separate ways: One is to change the recordset's `CursorType` property by using the following syntax:

```
recordsetName.CursorType = constant
```

where *recordsetName* is the name of the recordset, and *constant* is one of the constants listed in the first column of Table 5-1. You must define the recordset's cursor type before opening a recordset.

You can also specify the cursor type when opening the recordset by using this syntax:

```
myRecordset.Open "tableName/SQL", , CursorType
```

where *tableName/SQL* is the name of the table in the current database or a valid SQL statement (which we discuss in a moment), and *CursorType* is one of the constants listed in Table 5-1.

Many of the cursor type options are only relevant to multiuser databases. When working with a single-user database, the adOpenStatic setting is the easiest to work with.

Table 5-1 Recordset Cursor Types

Constant	*Name*	*Description*
adOpenDynamic	Dynamic Cursor	Allows unrestricted cursor movement. You can modify data in the recordset. Changes made by other users in a multiuser setting reflect in the recordset.
adOpenStatic	Static Cursor	Recordset is a nonchanging version of the table. Changes made by other users have no effect on the recordset.
adOpenForwardOnly	Forward-Only Cursor	Same as Static Cursor, but the cursor moves only forward through the table. This setting is the default if you don't specify a cursor type.
adOpenKeyset	Keyset Cursor	Like a Dynamic Cursor, but records added by other users aren't added to the recordset. Records deleted by other users are inaccessible to your recordset.

The .RecordCount and .AbsolutePosition properties only return correct values when you're using a static cursor type, which is another reason why we use adOpenStatic as the cursor type in our examples. When using a dynamic cursor, .RecordCount and .AbsolutePosition always return -1. because the number and position of the records in the recordset may change.

Field names in recordsets

In a recordset, each *record* is a collection of fields. You can refer to fields by their position in the record. myRecordSet.Fields(0) refers to the first field in the record, `myRecordset.Fields(1)` refers to the second field, and so forth. You can also refer to fields by their names. The syntax is

```
myRecordSet.Fields("fieldname")
```

where *`fieldname`* is the name of the field as defined in the table.

SQL and Recordsets

You don't have to base a recordset on a single table. You can base it on a query if you like. However, you can't use the query's name in the `myRecordset.Open` statement because only table names are allowed there. If you want to base a recordset on a query, you need to use the query's SQL statement to create the query.

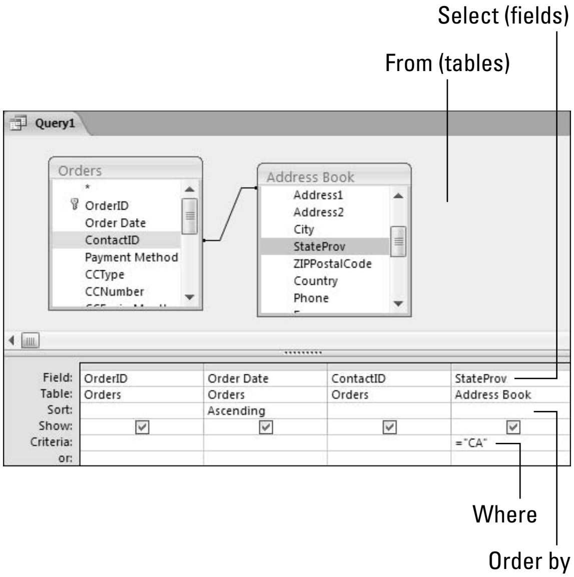
SQL (pronounced *see*-quel), stands for *Structured Query Language.* You can't get very far in database management without hearing some reference to SQL, because SQL is "the" standard language for extracting information from data stored in Access tables, Microsoft SQL Server, Oracle, and a whole bunch of other database products.

As a language, SQL is pretty simple. The syntax of a SQL statement looks something like this:

```
SELECT fields1 FROM table(s) [WHERE criterion] [ORDER BY
    fields2]
```

where *`fields1`* represents a list of fields from the table (or `*` for all fields), *`table(s)`* represents the name of the table (or tables) where the data are stored, *`criterion`* represents an expression that filters records (for example, `State="CA"`), and *`fields2`* represents fields to use for sorting the records. The `WHERE` and `ORDER BY` portions are optional.

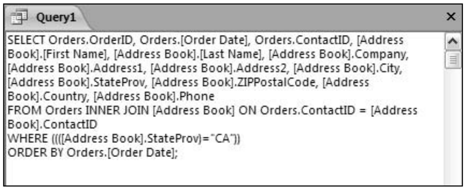
Writing SQL statements is fairly easy; you rarely need to write them by hand. Every time that you create a query by using Design view, you actually write a SQL statement. The fields that you choose for the query become the fields included in the recordset, although only those fields that have a check mark in the Show box are actually included. The `FROM` table that you select records from is plainly visible at the top of the grid. The Sort row defines the `ORDER BY` clause. The Criteria row specifies the `WHERE` clause, as illustrated in Figure 5-3.



Field:	OrderID	Order Date	ContactID	StateProv
Table:	Orders	Orders	Orders	Address Book
Sort:		Ascending		
Show:	☑	☑	☑	☑
Criteria:				="CA"
or:				

Figure 5-3: Every query contains components of a SQL query.

To see the SQL statement for any query you create, right-click the title bar of your query (in Design view) and choose the SQL option from the shortcut menu. Or, choose View➪SQL View from the Access menu. You see the SQL statement the query uses to get the data specified, as shown in Figure 5-4. The SQL statement may already be selected (highlighted); copy it, if you wish, by pressing Ctrl+C.



```
SELECT Orders.OrderID, Orders.[Order Date], Orders.ContactID, [Address
Book].[First Name], [Address Book].[Last Name], [Address Book].Company,
[Address Book].Address1, [Address Book].Address2, [Address Book].City,
[Address Book].StateProv, [Address Book].ZIPPostalCode, [Address
Book].Country, [Address Book].Phone
FROM Orders INNER JOIN [Address Book] ON Orders.ContactID = [Address
Book].ContactID
WHERE ((([Address Book].StateProv)="CA"))
ORDER BY Orders.[Order Date];
```

Figure 5-4: Sample SQL statement produced by a query.

If the SQL statement isn't already selected, drag the mouse pointer through the entire SQL statement to select it, and then press Ctrl+C. After you copy the SQL statement to the Clipboard, you can paste it into a `myRecordSet.Open` statement in VBA code where indicated by the SQL statement here:

```
myRecordset.Open "SQL statement here", , cursorType
```

Unfortunately, just pasting the SQL statement isn't quite enough to get the job done. You have to change some things in the VBA code, namely:

- ✦ You must remove the semicolon (;) from the end of the SQL statement.
- ✦ If the pasted SQL statement breaks across multiple lines, gather the lines together into one long line. (Or break up the line by using the continuation character, as we discuss in a moment.)
- ✦ If the SQL statement contains any double quotation marks ("), replace them with single quotation marks (').

Take a look at Figure 5-4 (earlier in this chapter) for an example of a big SQL statement. The first step is to select the SQL statement by dragging the mouse pointer through it until you highlight all the text. Then press Ctrl+C or choose Edit➪Copy from the Access menu to put a copy of the SQL statement on the Clipboard.

Within your procedure in the Code window, type out the `recordset.Open` statement, followed by two sets of double quotation marks. Place the cursor between the two quotation marks, as in the following example(where the | character represents the cursor):

```
myRecordSet.Open "|"
```

Press Ctrl+V to paste the SQL statement between the quotation marks.

The cursor lands at the end of the SQL statement, just to the right of the semicolon at the end of the statement. Press the Backspace key to delete the semicolon.

If the SQL statement breaks into multiple lines, you need to unbreak it. Move the cursor to the end of the first line. If a quotation mark is at the end of the first line, delete it. Then press the Delete (Del) key to delete the line break and bring the next line up to the current line. Leave a blank space between any whole words. Repeat this process until the entire SQL statement is one big, long line in the Code window.

Finally, look through the SQL statement for any double quotation marks. Don't disturb the quotation marks surrounding the whole SQL statement. Just change any double quotation marks within the statement, as in the following example:

```
WHERE (((Address Book].State="CA" ORDER BY
```

to single quotation marks as the following shows:

```
WHERE (((Address Book].State='CA' ORDER BY
```

When everything is clean, the Code window accepts the statement without showing any red lines or `Compile Error` messages.

Breaking up long SQL statements

In the previous section, we said that in order for a copied SQL statement to work in your code, you have to treat it as one extremely long line. An alternative to the one-extremely-long-line approach is to store the SQL statement as a string variable. Then use that variable name in your `myRecordset.Open` statement. Within the code, build the lengthy SQL statement by joining short chunks of text together.

The first step is to declare a string variable, perhaps named `mySQL`, to store the SQL statement, as the following variable shows:

```
Dim mySQL As String
```

Assign the SQL statement to the string. Use the following rules to assign the SQL statement:

- ✦ Each chunk is fully enclosed in quotation marks.
- ✦ If a blank space is after a word, leave that blank space in the line.
- ✦ Follow each line with an ampersand (&) character (the join strings operator), a blank space, and the continuation character (_).
- ✦ Use the variable name in the `recordset.Open` statement.

Don't forget: You still have to convert any embedded double quotation marks to single quotation marks, and then remove the ending semicolon.

The following example shows an original SQL statement. (Just imagine that the code stretches out as one long line, which the margins of this book prevent us from actually showing.)

```
SELECT Orders.*, [Address Book].* FROM [Address Book] INNER JOIN Orders ON
    [Address Book].ContactID = Orders.ContactID WHERE ((([Address
    Book].State)="NY")) ORDER BY Orders.[Order Date];
```

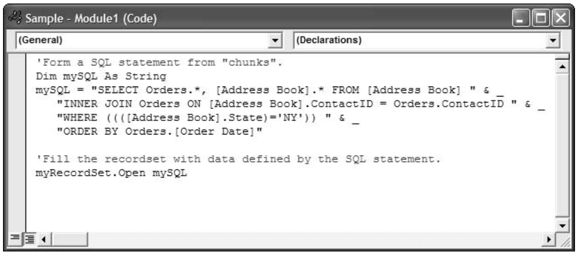
The following statements show some VBA code to store that SQL statement in a `mySQL` string variable. The `myRecordSet.Open` statement creates the recordset from the SQL statement:

```
'Form a SQL statement from "chunks".
Dim mySQL As String
mySQL = "SELECT Orders.*, [Address Book].* FROM [Address Book] " & _
   "INNER JOIN Orders ON [Address Book].ContactID = Orders.ContactID " & _
   "WHERE ((([Address Book].State)='NY')) " & _
   "ORDER BY Orders.[Order Date]"
'Fill the recordset with data defined by the SQL statement.
myRecordSet.Open mySQL
```

Notice a few essential characteristics of this code:

- Each chunk of the SQL string is enclosed in double quotation marks.
- The blank space after a word is included at the end of the line.
- The ampersand and continuation character, separated by single blank spaces, end each line.
- The `myRecordSet.Open` statement then uses the `mySQL` variable name in place of the lengthy SQL statement.

Figure 5-5 shows how this all looks in the Code window.



```
'Form a SQL statement from "chunks".
Dim mySQL As String
mySQL = "SELECT Orders.*, [Address Book].* FROM [Address Book] " & _
   "INNER JOIN Orders ON [Address Book].ContactID = Orders.ContactID " & _
   "WHERE ((([Address Book].State)='NY')) " & _
   "ORDER BY Orders.[Order Date]"

'Fill the recordset with data defined by the SQL statement.
myRecordSet.Open mySQL
```

Figure 5-5: A SQL statement stored in a `String` variable named `mySQL`.

Running Action Queries from VBA

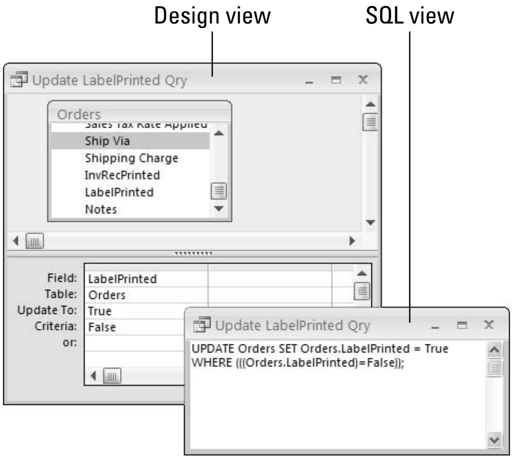
Everything we discussed about SQL so far in this chapter is about *select queries* — queries that select data from tables to display but don't in any way alter the data from the tables. *Action queries* actually change the contents of tables.

Book III, Chapter 3 introduces the update and append form of action queries.

To execute an action query from VBA, you don't need to define a recordset or use a `RecordSet.Open` statement. Instead, use the `RunSQL` method of the `DoCmd` object as follows:

```
DoCmd.RunSQL SQLstatement
```

Follow the same rules for executing an action query as you do a select query, as described in the "SQL and Recordsets" section earlier in this chapter. Figure 5-6 shows a sample action query to update records in Design view and SQL view.



Field: LabelPrinted
Table: Orders
Update To: True
Criteria: False
or:

```
UPDATE Orders SET Orders.LabelPrinted = True
WHERE (((Orders.LabelPrinted)=False));
```

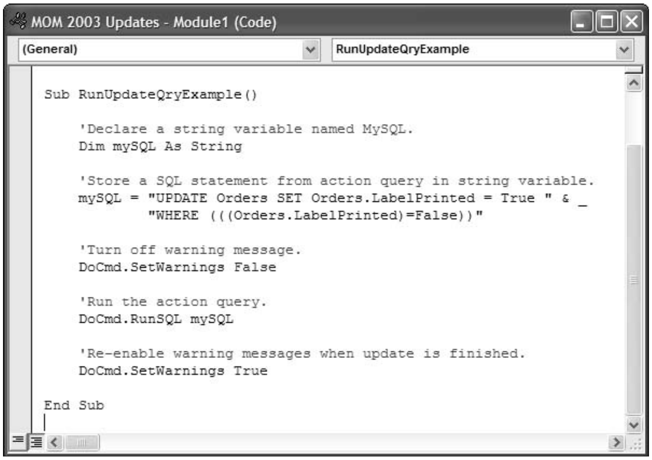
Figure 5-6: An update query in Design and SQL views.

In the VBA Code window, store the SQL statement in a string variable and follow the `DoCmd.RunSQL` statement with that variable name — as in the following example, where `mySQL` is the name of the variable that stores the SQL statement:

```
Sub RunUpdateQry()
   'Declare a string variable named mySQL
   Dim mySQL As String
   'Store an action SQL statement in the mySQL variable.
   mySQL = "UPDATE Orders SET Orders.LabelPrinted = True " & _
           "WHERE (((Orders.LabelPrinted)=False))"
   'Run the action query.
   DoCmd.RunSQL mySQL
End Sub
```

Normally, when you run an action query — whether from Access or from VBA — Access displays a warning before the query actually runs, stating that you're about to change records in a table — which gives you a chance to change your mind. In many cases, though, you won't want that warning to appear. For example, if you know the query does what it purports to do and you're writing code for other people to use, presenting them with a warning message that they may not know how to respond to is pointless.

To prevent that warning from appearing when your code executes, and in order for the query to run without asking for permission, use the `SetWarnings` method of the `DoCmd` object to disable the warnings. In Figure 5-7, the code includes a `DoCmd.SetWarnings False` to turn off permission-asking just before executing a `RunSQL` statement. The code then turns the normal warning messages back on (`DoCmd.SetWarnings True`) after the query runs.



```
Sub RunUpdateQryExample()

    'Declare a string variable named MySQL.
    Dim mySQL As String

    'Store a SQL statement from action query in string variable.
    mySQL = "UPDATE Orders SET Orders.LabelPrinted = True " & _
            "WHERE (((Orders.LabelPrinted)=False))"

    'Turn off warning message.
    DoCmd.SetWarnings False

    'Run the action query.
    DoCmd.RunSQL mySQL

    'Re-enable warning messages when update is finished.
    DoCmd.SetWarnings True

End Sub
```

Figure 5-7: Code used to execute action query without warning messages.

When you run an update, append, make a table, or delete a query from within a VBA procedure, use the query's SQL statement as the argument to a `RunSQL` statement in your code.

Cleaning up connections

Before your procedure ends, you may want to close both the recordset and the active connection to the local tables. Doing so prevents those objects from remaining open after your code moves on to other tasks. To close a recordset, follow the recordset's name with a `.Close` method, as in the following example:

```
myRecordSet.Close
```

To terminate the connection to the local tables in the database and remove the recordset and connection objects, set each one to the keyword `Nothing`, as below:

```
Set myRecordSet = Nothing
Set myConnection = Nothing
```

So that's what SQL and recordsets are all about in VBA. Will there ever come a time where you *need* to write all this complex code to perform some task? It depends on how complex your database projects are. But one thing is for sure: If you ever inherit a database that someone else wrote and come across a bunch of code with SQL statements and recordsets, the information in this chapter will at least help you better understand what's going on with that code.

Chapter 6: Debugging Your Code

In This Chapter

- ✓ **Identifying types of errors (bugs)**
- ✓ **Figuring out how to solve compiler errors**
- ✓ **Trapping and fixing runtime errors**
- ✓ **Digging out logical errors**

Instant gratification is rare in the world of programming. Nobody writes perfect code every time. Usually it takes some trial and error: You write a little code, test it, find and fix any *bugs* (errors), write a little more, test a little more, and so on until the code is fully *debugged* (free of errors) and runs smoothly every time. With the help of some debugging tools built into Visual Basic for Applications (VBA) and the VBA Editor, you can usually track down, and fix, any problems that are causing your code to fail.

Considering Types of Program Errors

Many things can go wrong while writing code, especially for a beginner. The ability to identify what type of error you're dealing with is helpful. The three types of errors that all programmers have to contend with are

- ✦ **Compiler errors:** These indicate a problem with the code that prevents the procedure from running at all. Messages alerting you to compiler errors often appear right in the Code window — such as when you type a faulty VBA statement and press Enter before you catch the goof.
- ✦ **Runtime errors:** The code compiles okay but fails to run properly in practice, often because of a problem in the environment. For example, if a procedure assumes that a certain form is already open in Form view, but the form is not, the code *crashes* — stops running — before the procedure completes its task.
- ✦ **Logical errors:** The code compiles and runs without displaying any error messages, but the code doesn't do what it's supposed to do.

Fortunately, the VBA Editor contains tools that help you track down, catch, and fix all these different errors. We start with compiler errors because you have to fix them before the code can do anything at all.

Fixing Compiler Errors

When you write code, the stuff that you're writing is referred to as *source code.* Before your code executes, VBA compiles your source code to an even stranger language that the computer executes very rapidly. You never actually see that compiled code — humans only work with source code. If a problem in the source code prevents compilation, though, you definitely see the error message.

Most compiler errors happen immediately. For example, if you type just **DoCmd.** and press Enter, you get a compiler error. The `DoCmd.` statement alone on a line isn't enough for VBA to compile the line. You need to follow `DoCmd.` with some method that's specific to the `DoCmd` object.

Not all compiler errors are caught the moment that you press Enter. Furthermore, code may be in your database (or project) that's never been compiled. When you call the code, it compiles on the spot and then executes. That extra step slows performance. To compile all the code in a database (or project) — both to check for errors and to improve performance — follow these steps:

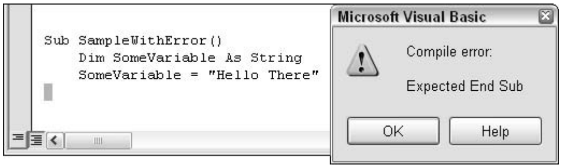
1. **If you're currently in the Microsoft Access window, go to the VBA Editor.**

   TIP

   When you're in the Microsoft Access window, you can press Alt+F11 to quickly switch to the VBA Editor.

2. **Choose Debug➪Compile *name* (where *name* is the name of the current database or project) from the VBA Editor menu.**

   Doing so compiles all the code in all standard and class modules. If any errors lurk anywhere, you see a `Compile Error` message box. The message provides a brief, general description of the problem, as in the example shown in Figure 6-1.



```
Sub SampleWithError()
    Dim SomeVariable As String
    SomeVariable = "Hello There"
```

Compile error:

Expected End Sub

Figure 6-1: A sample Compile Error message.

The location of the error is highlighted in gray. The Compile Error message box in Figure 6-1 shows that the compiler was expecting an `End Sub` statement at the gray highlight. You can click the Help button for more information about the error — although in this example, the fix is pretty easy. Every sub procedure needs an `End Sub` statement, and one of the procedures in this module has no `End Sub` statement. Click OK to close the error message box. Then type in the missing `End Sub` statement at the gray highlight.

When you can choose Debug➪Compile name without seeing any error messages, you know that all your code is compiled and free of compiler errors. The Compile command on the Debug menu is also *disabled* (dimmed) because no uncompiled code is left to compile. Any remaining errors are runtime or logical errors.

Trapping Runtime Errors

Some VBA errors may be caused by events in the environment rather than in the code. Here are a couple of examples:

- Your code performs some operation on data in an open form. If the form isn't open when the code executes, code execution stops, a runtime error occurs, and an error message pops up on-screen.
- Another example may be when an expression performs division using data from a table, and the divisor ends up being zero. Because dividing a number by zero doesn't make sense, code execution stops, a runtime error occurs, and an error message appears.

If people who know nothing about Access use the database that you create, the error messages that pop up on-screen won't likely help those users much. What you want to do is anticipate what kinds of errors may occur, *trap* them (that is, tell Access to let you know when they happen), and fix them when they occur. To do this, you add an *error handler* to your code, which is a chunk of code within the procedure that intercepts the error and fixes the problem without stopping code execution or displaying an error message.

To create an error handler, the first order of business is to add an `On Error` statement to your code — preferably just after the `Sub` or `Function` statement that marks the beginning of the procedure. Use one of the following three different ways to create an `On Error` statement:

- **`On Error Goto label`:** When an error occurs as a statement runs, code execution jumps to the section of code identified by label within the same procedure.
- **`On Error Resume Next`:** If an error occurs as a statement runs, that statement is ignored, and processing just continues with the next line of code in the procedure.

- **`On Error GoTo 0`:** This disables any previous `On Error Goto` or `On Error Resume Next` statements, so VBA handles future runtime errors rather than your own code.

You can use the `Resume` statement in any error-handling code to tell VBA exactly where to resume code execution after the runtime error occurs. The syntax for the `Resume` statement can take any of the following forms:

- **`Resume`:** Causes VBA to re-execute the statement that caused the error. You only want to use this statement if the error-handling code fixed the problem that caused the error in the first place. Otherwise, executing the same statement again just causes the same error again.
- **`Resume Next`:** Causes execution to resume at the first statement after the statement that caused the error. The statement that caused the error does not execute at all.
- **`Resume` *`label`*:** Causes execution to resume at the label specified.

In addition to the `On Error` statements, VBA includes a helpful object known as an `ErrObject`, which stores the error message that pops up onscreen when an error occurs. Each of those built-in error messages has its own number and text. The `ErrObject` stores that number and text, so you can write code to identify the error and work around it. The `ErrObject` has several properties. The two main ones — essential to understand first — are

- **`Err.Number`:** Returns either the number (integer) of the error that occurred or `0` for no error.
- **`Err.Description`:** Returns the textual description of the error that occurred as a string.

The `ErrObject` also supports a couple of methods, whose jobs can be summed up like this:

- **`Err.Raise(errNo)`:** Causes the error specified by `errNo` to occur. Generally used for testing error-handling code. (No practical reason exists to intentionally cause an error in actual working code.)
- **`Err.Clear()`:** Clears all current properties of the `ErrObject`. (`Err.Number` returns to zero, `Err.Description` returns to a null string, and so forth.)

Code created by Control Wizards and macro conversions may already have error-handling code written into it. Fortunately, you can easily enter such code into any procedure that you write. As a rule, you want the `On Error Goto` *`label`*`:` statement to execute early in the procedure. That way, no matter where an error occurs in the procedure, execution passes to the error handler.

The label text can be any text at all, provided that it starts with a letter and contains no blank spaces. Using the word `Err` and an underscore, followed by the procedure name and a colon, is customary. (The colon is mandatory.)

Place the error-handling code at the bottom of the procedure, just before the `End` function or `End Sub` statement. You need to place an `Exit Sub` statement, as well, before the error handler. That prevents code execution from reaching the error-handler code when no runtime error occurs.

Because you can't always anticipate every conceivable runtime error, having the error handler display the error number and error description is best — that way, at least, you know what caused the error. The following example shows an error message, where *`[main body of code]`* stands for all the code that makes up the actual procedure.

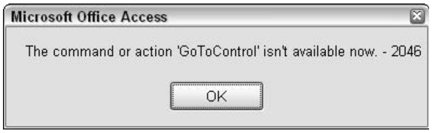
```
Sub myProcedure()
On Error GoTo Err_myProcedure
   [main body of code]
Exit_MyProcedure:
   Exit Sub 'Returns control to whomever called procedure.
'Error handler starts below.
Err_MyProcedure:
   Msg = Err.Description & " - " & Err.Number
   MsgBox Msg
   Resume Exit_MyProcedure
End Sub
```

The following list details what happens when a runtime error occurs while code in *`[main body of code]`* executes:

- **`On Error GoTo Err_myProcedure`:** Because this statement told VBA to transfer execution to the `Err_myProcedure` label, execution does not stop cold. Instead, execution continues at the first line after the `Err_myProcedure` label.
- **`Msg = Err.Description & " - " & Err.Number`:** Creates a string of text that contains the description of the error and the error number.
- **`MsgBox Msg`:** Displays the error message text and number in a message box with an OK button. Code execution stops until the user clicks the OK button in the message box.
- **`Resume Exit_MyProcedure`:** Causes execution to resume at the first line after the `Exit_MyProcedure` label.
- **`Exit Sub`:** Causes the procedure to exit without any further error messages.

Error-handling code, by itself, doesn't fix the error or allow the procedure to continue its job. However, if an error does occur, you see the message (text) and the number that identifies that message. So then you can add code to your custom error handler to fix the problem and resume code execution normally.

Suppose that the main body of the code is just trying to move the cursor into a control named `Company` on the current form, using the statement `DoCmd.GoToControl "Company"`. If you run the procedure when the form that contains the `Company` field isn't open, a runtime error occurs. The error handler displays the message box, shown in Figure 6-2. Code execution stops because nothing in the error handler takes care of the problem.



Microsoft Office Access

The command or action 'GoToControl' isn't available now. - 2046

Figure 6-2: A sample message displayed by an error handler.

The error description and number (`2046`) display in the error message. In this particular example, the `GoToControl` action isn't available because the form that the code expects to be open isn't open. The solution is to come up with a means of making sure that the appropriate form is open before the code executes.

Fixing the runtime error

One way to handle the problem is to use an `If...End If` block (or `Select Case...End Select` block) to provide a solution to error 2046. Because error 2046 is telling us that a form the code expects to be open is in fact closed, the solution is to open the appropriate form, as in the following example:

```
 [code above handler]
Err_MyProcedure:
   'Trap and fix error 2046.
   If Err.Number = 2046 Then
      DoCmd.OpenForm ("Address Book Form")
      Resume   'Try again now that form is open.
   End If
   'Errors other than 2046 still just show info and exit.
   Msg = Err.Description & " - " & Err.Number
   MsgBox Msg
   Resume Exit_MyProcedure
End Sub
```

Eliminating the runtime error

A cleaner, more elegant solution to the problem, though, is to rewrite the procedure so that the runtime error can't possibly occur. In the following example, the procedure starts by checking to see whether the required form is already open. If it's not, the procedure opens the form before the `DoCmd.GoToControl` statement executes:

```
Sub myProcedure1()
   On Error GoTo Err_myProcedure

   'Make sure Address Book form is open.
   If Not isOpen("Address Book Form") Then
      DoCmd.OpenForm "Address Book Form", acNormal
   End If

   'Now move the cursor to the Company field.
   DoCmd.GoToControl "Company"
Exit_myProcedure:
   Exit Sub
Err_myProcedure:
   Msg = Err.Description & "-" & Err.Number
   MsgBox (Msg)
End Sub
```

WARNING!

The `IsOpen()` function used in the preceding example isn't built into Access. (See Chapter 4 of this minibook for a description of the `IsOpen()` function.)

Dealing with Logical Errors

After your code is free of compile and runtime errors, Access executes every statement perfectly. But that doesn't necessarily mean that the code does exactly what you intended. If you were thinking one thing but wrote code that does something else, an error in the logic of the code occurs — a logical error.

Logical errors can be tough to pinpoint because when you run a procedure, everything happens so fast. You'll find slowing things down and watching what happens while the procedure runs helpful. Several tools in Access can help with that.

Watching things happen

You can use the Debug.Print statement anywhere in your code to print the value of a variable, a constant, or anything else. Because all output from the Debug.Print statement goes to the Immediate window, those statements don't disrupt the normal execution of your procedure.

Imagine writing a procedure that's supposed to make some changes to all the records in a table with the help of a loop embedded in your code. When you run the procedure, though, the expected result doesn't happen. You can put a Debug.Print statement inside the loop to display the current value of some counting variable within the loop, as in this example:

```
Function Whatever()
   [code]
   For intCounter = LBound(myArray) To UBound(myArray)
      'Show value of inCounter with each pass through loop
      Debug.Print "intCounter = " & intCounter
   [Code]
   Next
   [maybe more code]
End Function
```

If you run the procedure with the Immediate window open, the Immediate window displays something like this:

```
intCounter = 0
intCounter = 1
intCounter = 2
etc..
```

If some problem with the loop's conditional expression exists (the logic that makes the loop repeat *x* number of times), you may just see something like the following:

```
intCounter = 0
```

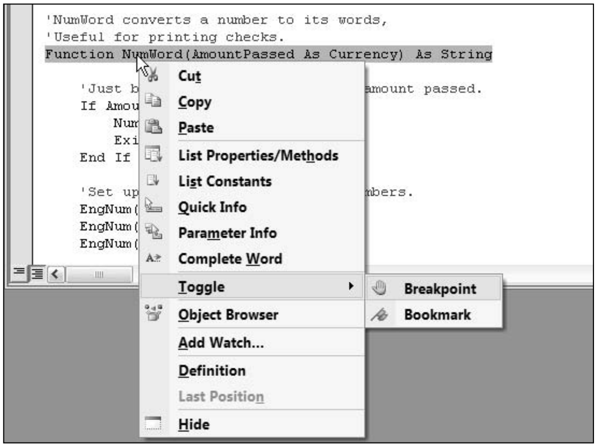
The preceding output tells you the loop repeats only once, with a value of zero. You need to go back into the code, figure out why the loop isn't repeating as many times as you expect, fix that problem, and then try again.

After you solve the problem, remove the Debug.Print statements from the code because they serve no purpose after the debugging phase is done. Optionally, you can comment out the Debug.Print statement by adding an apostrophe to the beginning of its line, thereby making it appear as a comment to VBA. After you comment out a statement, it is no longer executed in the code. To reactivate the `Debug.Print` statement in the future, uncomment it by removing the leading apostrophe.

Slowing down procedures

Another way to check for logical errors in code is to slow things way down to see exactly what's happening, step by step, while the procedure runs. To do this, you set a breakpoint at the line of code, right where you want to start slowing things down.

If you want the entire procedure to run slowly, you can set the breakpoint in the first line of the procedure (the `Sub` or `Function` statement). To set a breakpoint, right-click the line where you want to set the breakpoint and then choose Toggle➪Breakpoint from the shortcut menu, as in Figure 6-3. The line where you set the breakpoint is highlighted in yellow — and has a large dot to the left.



```
'NumWord converts a number to its words,
'Useful for printing checks.
Function NumWord(AmountPassed As Currency) As String

    'Just b                              amount passed.
    If Amou
        Num
        Exi
    End If

    'Set up                              mbers.
    EngNum(
    EngNum(
    EngNum(
```

Figure 6-3: Setting a breakpoint.

You can also open the Locals window to watch the values of variables change as the code is running in break mode. (After you set a breakpoint, the code runs in break mode, or one line at a time.) To open the Locals window, choose View➪Locals Window from the VBA Editor main menu. Like other windows in the VBA Editor, you can dock the Locals window to the VBA Editor program window or drag it away from the window border to make it free-floating.

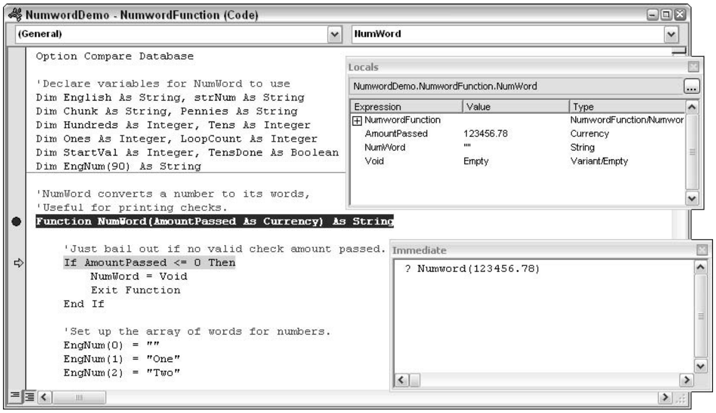
After you set a breakpoint, just run the code normally. Before executing a line of code, VBA highlights the line that's about to execute and shows an error to the left of that line. You have three choices at that point:

- To execute the one line (only), press F8 or choose Debug➪Step Into.
- To skip the currently selected line without executing it, press Shift+F8 or choose Debug➪Step Over.
- To bail out of break mode, press Ctrl+Shift+F8 or choose Debug➪Step Out.

TIP

Some types of runtime errors cause VBA to go into break mode automatically. You see the yellow highlight line when that happens.

While your code executes, the highlight moves from line to line. Each time that an executed statement changes the value of a variable, the Locals window updates to reflect that change, as in Figure 6-4.



```
Option Compare Database

'Declare variables for NumWord to use
Dim English As String, strNum As String
Dim Chunk As String, Pennies As String
Dim Hundreds As Integer, Tens As Integer
Dim Ones As Integer, LoopCount As Integer
Dim StartVal As Integer, TensDone As Boolean
Dim EngNum(90) As String

'NumWord converts a number to its words,
'Useful for printing checks.
Function NumWord(AmountPassed As Currency) As String

    'Just bail out if no valid check amount passed.
    If AmountPassed <= 0 Then
        NumWord = Void
        Exit Function
    End If

    'Set up the array of words for numbers.
    EngNum(0) = ""
    EngNum(1) = "One"
    EngNum(2) = "Two"
```

NumwordDemo.NumwordFunction.NumWord

Expression	Value	Type
⊞ NumwordFunction		NumwordFunction/Numwor
AmountPassed	123456.78	Currency
NumWord	""	String
Void	Empty	Variant/Empty

```
? Numword(123456.78)
```

Figure 6-4: Stepping through code.

Cleaning up

When you finish debugging or just want to start over with a clean slate, do one of the following:

- To clear the Locals window, right-click any text within the window and then choose the Reset option from the shortcut menu that appears.
- To clear all breakpoints from your code, choose Debug➪Clear All Breakpoints.

Of course, you can also close the Locals window by clicking the Close button in the window's upper-right corner.

Appendix: Installing Microsoft Access

If Microsoft Access is already on your computer, you don't need to read this appendix, unless you want to change something related to your current installation. If Microsoft Access 2007 isn't on your computer, you need to install it before you can use it. Microsoft Office Access 2007 isn't a program that comes free with Windows. You have to purchase it separately.

TIP

If you've just bought Access new, don't even think about throwing away the packaging until after the installation is complete. And never throw away the Product Key. You never know when you might need it to re-install the program again at some time in the future.

To install Access 2007 you need a Microsoft Office Professional 2007 or Microsoft Office Access 2007 disc, and the 25-character Product Key that came with it. You find the Product Key on the yellow sticker that's included with the rest of the packaging that came with your product. To get started with the installation, follow these steps:

1. **If you're currently using any programs, close them and save your work.**

   You don't need to close programs whose icons show in the notification area, just the application programs on the desktop.

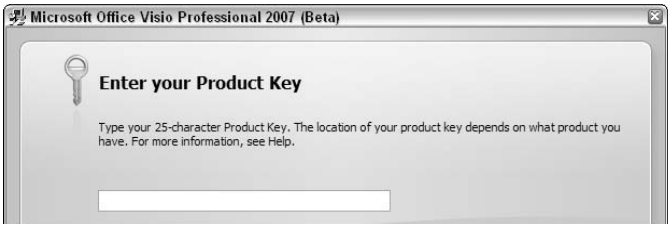
2. **Insert your Microsoft Office Professional or Microsoft Access disc into your computer's CD or DVD drive.**

   Wait a minute for the installation program to start. If no program starts automatically, choose Start➪My Computer, right-click the icon for your CD or DVD drive, and choose the AutoPlay option from the shortcut menu.

3. **You may see some security warnings asking for permission to proceed. These are standard warnings that appear whenever you install any program. It's okay to proceed with the installation.**

4. **After a brief delay, the installation program prompts you to enter your Product Key (see Figure A-1).**

   You don't need to type the hyphens in the key. You can use lowercase letters.



Microsoft Office Visio Professional 2007 (Beta)

Enter your Product Key

Type your 25-character Product Key. The location of your product key depends on what product you have. For more information, see Help.

Figure A-1: Enter the Product Key.

5. **When you've correctly typed the key, you see a green check mark to the right. Click Continue.**

6. **The End-User License Agreement (EULA) appears next, containing the usual legalese about licensing. Read the agreement (yeah, sure), which says you won't sell or give away copies of the program — and then check the *I accept the terms in the agreement* check box and click Continue.**

7. **If you have a previous version of Access (or other Office programs) installed, the next page asks whether you want to upgrade or customize. Before you choose, keep these points in mind:**

    - **Upgrade**: Your current versions of Access and any other programs you're installing will be replaced by the new 2007 versions, which means you can't use the old versions anymore.

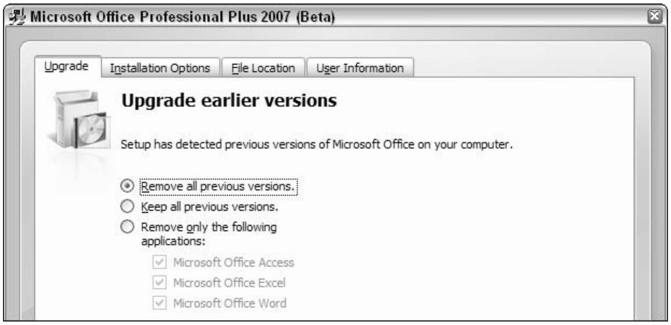
    - **Customize**: You can opt to keep your old versions and still have the new 2007 versions, too. Not a bad idea because it takes some time to get used to the new interface in 2007.

8. **If you choose Upgrade, click the Upgrade button. Follow any remaining on-screen instructions to completion. You can ignore the steps to follow.**

    If you want to use Access's new ability to use e-mail as a means of populating a table, you must upgrade to Outlook 2007. You cannot keep Outlook 2003 on your system. However, you will not lose your existing e-mail messages, contacts, or other Outlook information. All of that will appear automatically in Outlook 2007.

9. **If you click the Customize button, your first decision is whether to remove all previous versions, keep all previous versions, or just replace certain ones, as in Figure A-2.**

    If you want to keep your previous version of Access, be sure to choose Keep All Previous Versions. Alternatively, you can choose the option to remove only certain programs, but be sure to clear the check box for Access.



Microsoft Office Professional Plus 2007 (Beta)

Upgrade | Installation Options | File Location | User Information

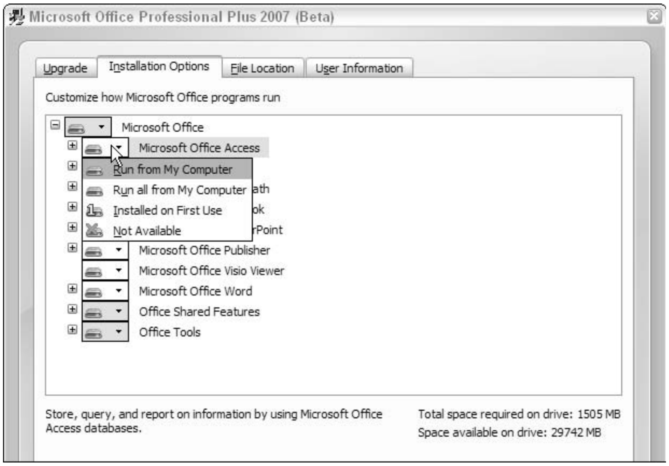
Upgrade earlier versions

Setup has detected previous versions of Microsoft Office on your computer.

● Remove all previous versions.
○ Keep all previous versions.
○ Remove only the following applications:
  ☑ Microsoft Office Access
  ☑ Microsoft Office Excel
  ☑ Microsoft Office Word

Figure A-2: Options for a Customized installation.

10. **To install all of Microsoft Access 2007, click the Installation Options tab, and choose Run from My Computer, as shown in Figure A-3.**



Microsoft Office Professional Plus 2007 (Beta)

Upgrade | Installation Options | File Location | User Information

Customize how Microsoft Office programs run

```
⊟ Microsoft Office
  ⊞ Microsoft Office Access
  ⊞   Run from My Computer
  ⊞   Run all from My Computer   ath
  ⊞   Installed on First Use     ok
  ⊞   Not Available              rPoint
  ⊞ Microsoft Office Publisher
    Microsoft Office Visio Viewer
  ⊞ Microsoft Office Word
  ⊞ Office Shared Features
  ⊞ Office Tools
```

Store, query, and report on information by using Microsoft Office Access databases.

Total space required on drive: 1505 MB
Space available on drive: 29742 MB

Figure A-3: More installation options.

If you're installing a full Microsoft Office suite, you can make similar selections for other programs.

Selections you make here will not override selections you previously made concerning upgrading versus keeping old versions.

Each time you choose Run from My Computer to install a component, the Total Space Required on Drive indicator (in the lower-right corner of the Installation Options window) shows how much hard-drive space the program will use, as compared to available disk space (shown in the Space Available on Drive indicator).

11. **Optionally, you can click the File Location tab and choose a different location for the installed programs.**

    It isn't necessary to change the File Location to keep previous versions of programs. Use that tab only if you have some other good and compelling reason to store the installed programs on another drive or a folder other than the Program Files folder.

12. **(Optional) Click the User Information tab and enter information about yourself.**

    User information is used by some programs to identify you as author or reviser of documents.

13. **Click Install Now and follow the on-screen instructions.**
14. **Wait.**

The rest of the process is largely automatic. If you see any additional on-screen instructions, follow them. But the installation should proceed on its own from this point forward. When it's done, you'll see a Register for Online Services option. It's a good idea to do that because those services might prove to be a valuable resource for future information. But if you miss that opportunity, no big deal. You can register for online services at any time.

If you see an option to Delete Installation Files, best to leave that alone. The installation files make it easier to install any components you might have skipped on the first pass. If you choose that option, you can still install those components; you'll just need to insert the original CD to do so.

WARNING!

Be sure to store your original disc and Product Key in a safe place where you can easily find them in the future. You just never know when a bad disk crash or nasty virus will force you to reinstall Access from scratch!

Activating Access

Microsoft now requires product activation, which is a process designed to prevent people from installing their products on multiple computers. The first time you start Access (or some other Office application program), you're prompted to activate the product. Just go ahead and follow the instructions on-screen to activate.

TIP

When Microsoft came out with product activation, many people were alarmed that Microsoft would spy on them, correlating their Access usage with their personal information, and other appalling privacy invasions. As it turns out, product activation doesn't do any of those things. Product activation is unconnected with product registration, which is when you give Microsoft your name and address. Activation just connects your Office Product Key with your specific computer, so no one else can install your Office license on his or her computer. Go ahead and activate Office with no worries!

Repair, Reinstall, or Uninstall Access

If something bad happens to your hard drive and you can't start Access on your computer, you may have to reinstall or repair it. Or, if you opted to omit some optional components, you may later change your mind and want to install some component you previously declined.

First, close the program you want to change or repair. Then get to your list of installed programs in one of these ways:

- In Windows XP, click Start⇨Control Panel⇨Add or Remove Programs.
- In Windows Vista, click Start⇨Control Panel⇨Programs ⇨ Programs and Features.

Click the Microsoft Office Access 2007 or Microsoft Office 2007 suite that contains your Access installation. Then click the Change button. You're taken to a set of options similar to those shown in Figures A-2 and A-3, where you can repair or remove a program, or add missing components.

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